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Environmental Protection Agency
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**Protecting
Water**





Saving Our Water Wealth

EPA's role in the vital task of protecting the Nation's finite resource of water is the major theme of this issue of the *Journal*.

Fierce competition for usable water has long existed in the West and periodic droughts in the Northeast are portents of the shortages certain to develop in this relatively water-rich section of the country in the future.

Of even greater immediate concern is the quality of the water used for the country's drinking supplies, part of the critical problem of Health and the Environment discussed by Administrator Douglas M. Costle in this issue. The *Journal* will carry a major review of the drinking water problem soon.

The magazine has an interview with Thomas Jorling, Assistant Administrator for Water and Hazardous Materials, several pieces on various pollution control programs, and articles by two of the major architects of the Clean Water Act,

Sen. Edmund S. Muskie and Sen. Robert T. Stafford.

Other subjects covered are a report by Truman Temple on marine research being conducted at one of the Agency's key laboratories, and a look at one of the results of failure to adequately protect water resources—a growth in the world's deserts. □

EPA JOURNAL

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Health and the Environment

By Douglas M. Costle, Administrator

When the cost of health care in America has risen to \$140 billion a year, with most of this going for after-the-fact attempts at treatment and cure, it is obvious that we need to reorder our national and individual priorities. How much more health-effective and cost-effective it would be if more emphasis were placed on prevention—on keeping harmful materials out of the air, water, and soil—and out of our people.

In the United States, national concern for the environmental aspects of public health is of fairly recent origin. Not until after World War II did we really become aware of the health dangers, both immediate and long term, of many of the substances we produce, use, and often release into our environment.

The ratio of environmentally-induced disease to all diseases is large and growing larger. As Dr. Ernst Wynder has pointed out: "In a society where infectious diseases have been largely overcome through sanitary measures, immunization, and anti-biotics, the major causes for today's toll are largely unhealthy lifestyles, unhealthy working environments and disease-producing products."

The more experience we gain, and the more data we accumulate on the health effects of pollutants, the deeper our concerns become. Scientists have developed compelling evidence that children can contract chronic and acute disabilities as a result of air pollution. One study concluded that as many as 20 percent of the children in a city such as New York can develop severe and chronic respiratory diseases. During the 1973-74 oil embargo, the most significant factor in a dramatic drop in death rates in the San Francisco area—a 13.4 percent decrease compared with the same period over the previous four years—appears to be reduced exposure to pollutants from auto exhausts.

The World Health Organization estimates that from 60 to 90 percent of all cancer is the result of "environmental factors" in the broadest sense of the term. The rate of cancer deaths is greater than at any time since World War II; the

incidence is especially high in communities where there is a heavy concentration of chemical industries. When Dr. David Baltimore of MIT received the Nobel Prize in 1975 for his work linking viruses and cancer, he said: "The role of viruses in cancer is small. The best hope today for cures is research into environmental causes of cancer."

Each day, each of us breathes 16,000 quarts of air. They often contain a debilitating mixture of sulfur oxides, carbon monoxide, photochemical oxidants, nitrogen dioxide, particulates, and other airborne pollutants.

We have accumulating evidence that mercury, lead, and cadmium in the environment can attack the central nervous system. We know that fluorocarbons weaken the protective shield of the ozone layer, greatly increasing the risk of skin cancer. Last year, we acted to ban fluorocarbons in interstate commerce as of April 15, 1979.

There is clear evidence that carbon tetrachloride and chlorinated phenols can damage the liver; ethylene glycol and cadmium sulfate can produce kidney disease; asbestos and beryllium can cause lung disorders; vinyl chloride and arsenic can cause cancer.

Asbestos and chloroform have been found in our drinking water. In fact, we are now aware that chloroform and other trihalomethanes occur in drinking water as a result of the way we have been chlorinating that water to make it safe for drinking. So our problems are compounded by the irony that, in treating water to protect public health, we can actually create reactions that could prove harmful.

Another chemical trouble spot was the discovery of the widespread contamination of the Nation's waters by polychlorinated biphenyls (PCB's). Yet another was the revelation that the pesticide, Kepone, had caused nerve damage among workers.



Incidents like these helped to convince Congress to pass the Toxic Substances Control Act. This law marks a recognition that we live in a chemical age, and that that age may be a mixed blessing. These chemicals will be our single greatest environmental challenge in the next couple of decades. They seem to be everywhere, if often only in small quantities.

The kinds of problems I have just mentioned do not lend themselves to quick-fix solutions. They demand thoughtful, rational, careful analysis and decision-making. And this kind of analysis and decision-making cannot be carried out in a vacuum. Nor can the problems simply be handed over to government officials, however ethical and competent, with instructions to "solve them—tell us what to do." The problems are deeply rooted in our highly technological industrialized society, and they must be addressed in terms that are not just acceptable to, but in fact arrived at by, that society.

For most toxic chemicals, for instance, the decisions are not going to be that clear-cut. We're going to have to make tough judgments about the appropriate degree of control, weighing the risk posed by a given chemical against its economic importance.

With the Toxic Substances Control Act, EPA is now required to regulate not just the residues of dangerous chemicals, but their manufacture, use, and distribution. This is a new order and a big one. I believe I am safe in predicting that within a decade this program will dominate all others in EPA. It will shift our emphasis to prevention, to keeping harmful substances out of our air, water and soil, rather than concentrating on cleaning them up after the damage has been done.

We have not abandoned our concern with the natural environment.

Understanding human impact on the environment provides us with critical clues regarding our own present and

future well-being (and environmental harm often serves as an "early warning" about potential threats to public health). In addition, there is a close correlation between measures that protect public health and those that protect the environment. But we clearly have an increased concern with public health issues. This concern is well illustrated by our strong new focus on toxic chemicals.

There is growing concern on the part of the public about what the chemical age has done to its world. Along with this, however, there's also a growing skepticism about how real some of the dangers are.

I don't believe that this skepticism means there is a widespread sentiment for giving up on efforts to deal with new public health threats. In fact, I'm very conscious of a very strong opposite pressure; that is, to get the toxic contaminants out of our air and water so that people won't face being involuntarily exposed to them.

However, the response does mean that both public and private officials concerned with health matters have an important responsibility.

For governmental agencies like EPA, it means we have to be candid, laying what we *do* know about toxic chemicals before the public, but making clear where our knowledge is limited.

For industry, it means not attempting to play on the public's doubts. Legitimate concerns about the chemical revolution deserve better than a Madison Avenue counter-attack by the private sector.

And for the health community, it means making a far greater commitment than has been shown in the past to examining the health effects of toxic chemicals, and to educating the public about such effects. Leaving this duty to government alone is a luxury that this country can no longer afford. □

Senate Leaders Explain Water Legislation

Two views of the significant new amendments to the Federal Water Pollution Control Act are presented in the following

articles. One is by Senator Edmund S. Muskie, Chairman, Subcommittee on Environmental Pollution, Senate Commit-

tee on Environment and Public Works, and the other is by Senator Robert T. Stafford, ranking minority member of this commit-

The Meaning of the 1977 Clean Water Act

When Congress debated the 1972 Amendments to the Federal Water Pollution Control Act, mid-course corrections were promised.

The Clean Water Act of 1977 has fulfilled that promise—and it also maintains the original promise of clean water for the American people.

More than seventy changes were made in the existing law. Most enhance the ability of the Administrator of the Environmental Protection Agency to deal with complex water pollution problems. We made some requirements more flexible, but we have not strayed from our basic goals.

We have maintained our goal to eliminate the discharge of pollutants by 1985.

We have maintained the policy that the public must be protected from cancer-causing pollutants and other toxic poisons.

We have maintained the concept that industry must use the best available technology to control pollution.

We have renewed our commitment to provide adequate funding to publicly-owned treatment plants.

The new law reflects needed compromise without diminishing our overall pollution control capability. As an example, the Administrator is given flexibility in determining treatment levels for well known conventional pollutants but is given little leeway in the enforcement of controls on the thousands of toxic chemicals that are dumped daily into America's rivers and lakes.

The success of the Federal Clean Water Law has been uneven. Programs affecting municipalities faltered because of uncertain funding and excessive red-tape. But the programs aimed at industrial compliance fared much better.

An estimated 90 percent of the Nation's industries met the July 1, 1977, deadline for use of best practicable technology. My home State of Maine was one of only three States where industry achieved total compliance with requirements to use the best practicable clean-up technology last July, and the improvement in water quality has been noticeable.



By Senator
Edmund S. Muskie (D-Me.)

Despite this success, however, the 1977 Act makes some changes in the 1983 industrial requirements.

First, the concept of uniform application of the requirement to install the best available technology by 1983 was broadened by the creation of three categories of pollutants—conventional, non-conventional, and toxic pollutants. Best available technology requirements in existing law will still generally apply to toxic and non-conventional pollutants, while a new level of treatment called "best conventional technology" is created to deal with conventional pollutants.

In creating this new level of treatment, which is somewhere between best practicable and best available treatment, Congress determined that for conventional pollutant discharges, best available control may require an unreasonable degree of treatment. In order to reduce the 1983 requirements in these cases, effluent guidelines for specified conventional pollutants are to be written to reflect a new level of treatment reflecting continued progress beyond what has already been achieved.

Congress has recognized that toxic substances have become the most serious water pollution problem in recent years. The 1977 Act strengthens EPA's authority to control toxic pollutants by:

- requiring industry to meet best available technology standards for specified toxic pollutants by July 1, 1984. This action codifies EPA's existing toxics policy;
- requiring compliance with best available technology standards for newly listed toxics within three years. The process of adding a toxic pollutant to the toxics list has been simplified.

The new non-conventional pollutant category created by the 1977 Act will include all those pollutants which have yet to be determined either toxic or conventional. Industry has been given until 1987 to comply with the best available technology requirement for non-conventional pollutants. However, waivers from best available technology can be obtained if industry can provide proof that such non-conventional pollutants will not interfere with the attainment or maintenance of the national water quality standard, that is, water quality assuring protection of public water supplies, and the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities, in and on the water. Congress has given the Environmental Protection Agency further control over non-conventional pollutants suspected of toxicity by recognizing its responsibility to assure that such pollutants do not pose an "unacceptable risk to human health or the environment. . . ."

The second major change affecting industrial compliance within the Clean Water Act of 1977 is the additional time given to meet the 1977 requirements for best practicable technology.

An extended deadline of April 1, 1979, is established for those industries acting in "good faith" in trying to comply with the July 1, 1977, deadline. However, as many as half of those who have failed to comply with pollution requirements may have done so because of a lack of good faith or a

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The Future of the Construction Grants Program

Several notable changes were *NOT* made in the Clean Water Act of 1977. For instance, it is still our objective to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

It is still our goal to eliminate by 1985 the discharge of pollutants into those waters and, in the interim, to attain a water quality suitable to support fish, shellfish, and wildlife, and human recreation in and on the water.

It is still our purpose to require wastewater treatment management practices, in the public as well as the private sector, which will achieve these goals.

The law still states that all publicly owned treatment works shall comply with the requirement for the "best practicable waste treatment technology" over the life of the system.

Most specifically, the Act still exhorts the Administrator of the Environmental Protection Agency to encourage municipal and regional waste treatment management that results in the construction of revenue-producing facilities that provide for—

- (1) the recycling of pollutants through the production of agricultural, silvicultural, or aquacultural products;
- (2) the confined and contained disposal of pollutants not recycled;
- (3) the reclamation of waste water; and
- (4) the ultimate disposal of sludge in a manner that will not result in environmental hazards.

This, and not conventional "secondary treatment" or advanced chemical waste treatment, is what Congress had in mind in requiring the "best practicable waste treatment technology."

It is worth repeating these paraphrases of the statute because, evidently, too many people on whom we rely to carry out the Act have lost sight of what Congress intended back in 1972.

Under the authority of P.L. 92-500, EPA has distributed the staggering sum of \$19.48 billion to States and their local subdivisions in order to finance \$26 billion worth of construction of municipal treatment works. According to testimony received by the Subcommittee on Environ-



By Senator
Robert T. Stafford (R-Vt.)

mental Pollution, only 13 percent of the step 2 and 3 projects being financed by the construction grants program involve land application—and most of these are smaller category projects, under 5 million gallons per day. The rest goes for biological secondary treatment or advanced waste treatment plants and the sewers that feed them, or for other conventional treatment processes that discharge partially treated waste water into our lakes, streams, and oceans and produce a sludge that also frequently finds its way to the sea.

To underscore Congress's original intent, the 1977 Clean Water Act prohibits the Administrator of EPA from making a municipal construction grant unless an applicant demonstrates that he has studied and evaluated "innovative and alternative wastewater treatment processes and techniques which provide for the reclaiming and reuse of water, otherwise eliminate the discharge of pollutants, and utilize recycling techniques, land treatment, new or improved methods of waste treatment management for municipal and industrial

wastes . . . and the confined disposal of pollutants, so that pollutants will not migrate to cause water or other environmental pollution." (Sec. 201(g)(5))

Why does Congress persist with these notions of recycling, land treatment, revenue-producing facilities? Two reasons, basically: the disappointing performance of the conventional technologies, and money.

When measured in dollars or number of projects processed by government agencies, in business generated in the engineering and construction sectors of the economy, or in man-years of jobs created, the results of the construction grants program seem prodigious. The facts are, however, that fewer than one-third of the Nation's municipalities met the July 1, 1977, deadline for secondary treatment or treatment to meet applicable water quality standards. Worse still, by EPA's reckoning, over 50 percent of all plants in operation fail to meet design specifications. Furthermore, communities are beginning to realize what a sewage treatment system really costs—in operation and maintenance, energy consumed, and sludge disposal.

To deal with the problem of municipal noncompliance, largely a result of the unavailability of sufficient Federal matching funds, communities are given a case-by-case extension of time to achieve the required effluent limitations as soon as construction can be completed, but not later than July 1, 1983. No relief is available for failure to meet the standards when improper operation or maintenance is the cause.

To provide financial assistance to continue the municipal clean-up effort, the 1977 Act authorizes nearly \$25 billion for Fiscal Years 1978 to 1982. Of this sum, \$4.5 billion has already been allotted to the States. In order to permit careful planning, the Committees which authorized the Clean Water Act are seeking advanced appropriations for Fiscal Years 1979, 1980, and 1981, so States will know how much money will become available two or three years ahead. Recently, the President requested advanced appropriations of \$4.5

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Protecting the Integrity of U.S. Water

An Interview With Thomas C. Jorling, Assistant Administrator for Water and Hazardous Materials.

This interview was conducted by Charles Rogers, Public Awareness Associate Director for Water and Hazardous Materials; Truman Temple, Associate Editor, and John Heritage, Assistant Editor, EPA Journal.

You administer what has been called the Nation's largest public works program, helping build sewage treatment works. What is this program's future?

It is accurately described as the largest public assistance program presently administered by any Federal agency. We are now spending more Federal dollars per year than the highway program or the traditional public works activities of the Corps of Engineers. So, in that sense we are the largest. But I would emphasize it is public assistance rather than public works.

The future of the program is more sound and secure now than it has been. The President has given it a 10-year commitment. Congress, in the Clean Water Act of 1977, gave five years of authorization and I think it is safe to say that the necessary budget should follow. There are still some uncertainties that we can never avoid, but the political support for the program looks secure.

This encouraging outlook depends, however, on the way we manage the program. The only way we can make a special claim on the taxpayer's dollar, a claim being won over a long period of time, is to assure the public that the dollars are being used for a special objective, namely, environmental protection. If the program is not managed to carry out that primary purpose, then we will lose support very, very quickly. If it becomes nothing but an economic development effort, we should lose public and political support. There would be many better vehicles for that kind of program than building waste treatment plants.

What role do you see for land treatment of municipal waste water?

Congress and the Administrator of this Agency are of one mind in this. Alternatives such as land treatment are to be given increased opportunity. But we are trying to overcome a lot of difficulties in pushing this policy, which was set by

the 1972 and 1977 changes in the water quality law.

Municipal waste in its present form contains a very high level of nutrients and other valuable materials. These resources can be used very effectively in agriculture and silviculture. Our objective is to use these materials in such productive ways.

We are, however, overcoming a long tradition in sanitary engineering that runs contrary to that notion. We are also running counter to the perception in our society that human waste is evil. That is a relatively new phenomenon associated with urbanization more than anything else.

It is very difficult to deal with. Americans are subjected daily to a barrage of suggestions that dirt is bad and anything that smells is bad. On TV, the evil of germs is given a special significance. Bad odor also takes on special significance. The public has come to view anything associated with waste as bad.

We have to overcome this attitude if we are to reuse municipal wastes in productive systems on a large scale. Fifty years ago most people had experience with rural agricultural systems where waste material reuse was a routine matter—and still is. We have to go back to the basics and back to the roots. We have to reintroduce in the public consciousness the idea that wastes can and should be recycled.



There are some other difficulties that are also a function of urbanization, namely the many synthetic chemicals in waste streams. Heavy metals and synthetic or persistent organics are in municipal waste systems and we must remove them if we are to utilize the water and nutrients effectively in agriculture.

That is why we are placing so much emphasis on the removal of toxic pollutants at the source, in the water program as well as in other programs within the Agency. We want to utilize the beneficial materials in the waste stream, while at the same time protecting public health and the environment from the effects of these new chemicals that flow from our industrial society.

Is the United States a world leader in the technology of wastewater treatment?

We are a leader in the application of conventional technology. Consider the number of population centers where we have used various forms of treatment. But other nations have achieved a great deal in alternative technologies and we are learning a lot from them. It is important that we keep exchanges and interchanges like those we have with the Soviet Union and Japan. Another example is our efforts regarding some of the Australian land treatment systems. We want to help improve the rate of development and transfer of their knowledge. We also want to help in the application of these technologies as they are realized. That's where this Nation's genius is.

Take another technology—water supply. Here, we will learn a great deal more from the Europeans than we will teach them. Their use of activated carbon in water treatment is much further advanced, especially on a large scale, than in the United States. So there are others that are further ahead in some elements of life support technology.

Did the Australians pioneer in land treatment?

Everybody was a pioneer. Land treatment was common a hundred years ago. Then with urbanization of the type we have experienced, it went into disfavor. I think now we are among the leaders in the development of land treatment systems. The Muskegon, Michigan, system—for a large, joint municipal-industrial system—is probably the finest designed and operated system anywhere. It is visited by people from all over the world.

So we are on the leading edge of land treatment. The thing that the Melbourne, Australia, experience gives us is an opportunity to review what 180 years of continuous land treatment to soil does. It doesn't, in fact, build up toxic concentrations of heavy metals, synthetics or persistent organics in the soil.

Are you comfortable with the 1977 changes in the clean water law?

The general answer to the question is, yes. The water quality law was left basically intact by Congress in the 1977 Amendments. In fact, the existing statute was supported strongly. So we feel that in most respects, through the municipal program, the planning elements of the program, industrial regulations, and wetlands protection, the law is intact.

Also, many things have been changed to improve the law's administrative character and we are now in a very strong position to go forward for the next four or five years with aggressive implementation. We received some new authorities that we requested. There were some clarifications made. Most of the controversial political issues were resolved, very favorably.

Some issues—such as user charges, reserve capacity and conservation amendments—caused some change contrary to Administration positions. But the changes were not so contrary that we cannot make the program work very effectively. So, we are very pleased with the outcome.

Did the 1977 Amendments uphold the clean water objectives set by Congress in 1972?

In all respects, yes. All of the policies, from the protection of the integrity of the water to the elimination of discharge, were upheld and continue to be very operational policies and goals.

These policies are beginning to produce some real change. We now have zero discharge limits set for 35 industrial subcategories. We expect that in the next few years, increasing numbers will be meeting the zero discharge limitation. We won't achieve zero discharge for all subcategories by 1985, as the goal projects. But we are making some substantial changes in the way industrial engineers and industrial executives are focusing on their processes, and that's going to cause very significant change over the next decade.

So we see the policies and goals of the 1972 Act being supported by Congress, and in fact, producing change out there on the landscape.



Could you explain the significance of biological integrity of the water as a Congressional goal?

Biological integrity is a policy that recognizes the key role that water plays in the planet's life support system, not just for human beings, but for all creatures. If the biosphere is to be secure and we are to avoid markedly reducing the capacity of the life supports, the most prudent policy is to keep the water system in condition to carry out its part.

In the debate over drinking water standards, are major compromises needed?

We certainly have struck a very sensitive nerve with the proposed organics regulations. In our hearings on them, I think it is safe to say that the water utilities are generally opposed to the regulations in their present form. The utilities are opposed on a number of grounds. First is cost. Second is the uncertainty with respect to the need to protect public health and welfare from exposure to organic chemicals in drinking water. Third is the uncertainty surrounding carbon technology. And there are variations on these three themes.

We are not sure yet whether the proposal will require modification before it is promulgated. There are some areas in which we do have concerns and unless we can address those concerns satisfactorily, some adjustment will be required. It is clear that the routes by which people are exposed to organic chemicals are increasing. In the many areas of the country that draw their water supply from rivers contaminated with organics, the public must be protected from excessive exposure.

This is another question related to the 1977 Amendments. Did they weaken or strengthen the cleanup requirements of industry?

They significantly strengthened the requirements. Though the 1972 Act supported a regula-

tory focus on specific chemicals, this approach had not been implemented by our Agency. With the consent decree that EPA entered into with the Natural Resources Defense Council, we began to shift to the focus called for in 1972, namely specific control over specific chemicals. In the 1977 Act, Congress gave that program a firmer legislative underpinning. Congress said loud and clear, "Control specific toxic chemicals in the industrial waste stream. Do that in a very aggressive way and when you do it, industry must comply."

That latter point is very significant. Under the 1972 Act, when a Best Available Technology standard was written, an industry source could seek a variance of two sorts. It could seek one on the grounds that it was economically unable to meet the standard. Secondly, it could ask for a variance on the basis that actual environmental circumstances did not require that level of control for the facility. In the 1977 Act, these two procedures were taken away from industry. The effect is that when we write our Best Available Technology standards for toxic pollutants over the next 18 months, industry must comply. Although the date of compliance has been extended from 1983 to 1984, industry must control the discharge of those pollutants at the specified level. There is no provision for a variance. That provides us with a tremendously improved regulatory structure, which will produce great dividends in removing those materials from release into the environment.

What are some other issues that you see as critical in water quality? What about the status of effluent guidelines and discharge permits?

The greatest difficulties concern our structure for regulating point sources of pollutants. How do we incorporate into that structure all the pertinent authorities, some that are within the Office of Water and Hazardous Materials and some from elsewhere in the Agency? It requires new conceptual tools, new management tools. This job of effectively integrating our regulatory authorities is going to tax us as an Agency.

We have authority to set control requirements on point sources of pollution discharge. We have authority to set best management practices to stop pollutants from reaching the water through routes other than pipes. We have authority under the Resource Recovery Act to manage and control all hazardous wastes. Under the Safe Drinking Water Act we have authority to protect the groundwater by controlling the injection of chemicals into subsurface areas. We have authority to set spill prevention plans to avoid the discharge of oil and hazardous materials.

We have this large volume of authority. A lot of our efforts and resources will be spent over the next four or five years to bring these programs to bear in a coordinated, cost-effective way on each site where pollutants could be released into the environment.

The challenge is similar in the planning area. We have authority under the Clean Water Act to do planning. There's planning authority under the

Safe Drinking Water Act, the Resource Recovery Act, and the Clean Air Act. We will try to bring these authorities together as a single environmental management planning effort. That takes a great deal of skill in management and execution. Each statute has a different orientation, a slightly different set of procedures, and our task is to bring these massive authorities to bear on an integrated basis.

It can be done. The work of the Association of Bay Area Governments is one example of environmental management planning. All environmental planning was done at the same time, in a single exercise. The San Francisco Bay area approach has been very controversial but it is very necessary. We'll see that kind of principle applied more widely across the country over the next few years.

As far as other issues, in the industrial area we can expect tremendous strides in process change. The basic outcome will be to reduce the release of materials into the environment. There are already some exciting developments. For instance, Dow Chemical and Allied Chemical have both adopted, as corporate policy, the elimination of discharge of pollutants.

Isn't EPA coming out with a lot of new regulations on water pollution?

We are proposing and promulgating many regulations. This is the first effort to take the 1977 Amendments and translate their legislative changes into programs.

Recently we announced a national strategy to control the industrial discharge of harmful wastes into municipal sewers. Such discharges add heavily to the toxic substances going into the Nation's waters. About 50,000 industries are involved.

To start implementing the strategy, we have issued regulations to require the industries to pretreat their wastes before discharging them into municipal sewers.

In late April the Agency published some rules for the municipal waste treatment plant construction program. Partly, the aim is to discourage the urban sprawl and reduce the environmental problems that can be associated with large municipal waste treatment plants. Some of the rules were effective immediately; others were proposed.

Also in April we proposed a regulation to set the terms under which some coastal cities could qualify for permits to discharge into deep ocean waters sewage that had received less than secondary treatment. These regulations are in response to a Congressional amendment to provide some relief for certain coastal cities. The burden of proof is clearly on the applicants to show that their discharge won't adversely affect the marine environment.

You observed EPA as a Congressional staffer and from an academic vantage point. What do you think now that you're inside?

I have been a critic of the Agency and still am in some respects. Some of the focus of my criticism has shifted. Before I came into the Agency, I was very critical of the slowness of the response to alternative technology, such as land treat-

ment of waste water. It didn't seem to be the kind of implementation of the '72 statute that I thought was provided for. There are some decisions that were made in the Agency that I was very critical of, such as the Mahoning Valley steel decision.

Coming into EPA, I have become aware of the dimensions of what it takes to get a decision out. There are the hurdles, the procedural steps, the time it takes. All of these have given me some new appreciation of the capability of the Agency to do the right thing. I think EPA is the best staffed and managed Agency in the Federal Government. I've grown to respect the degree of energy, the resources, dollars, and the commitment it takes to get a task accomplished.

But I tend to be very frustrated by some obstacles as I try to push decisions through. One of the perplexing things, from a political science vantage point, is that government has almost paralyzed itself with the number of procedures that must be followed, the number of interactions that must be taken, the immense difficulty in doing business. We have saddled government officials with a great deal that reduces their ability to govern, to perform in the public interest. That's a problem that we're all going to be facing and must deal with.

What is your main goal?

My main goal is to carry out the tremendous amount of legislative authority that we presently have available to us and to do it as professionally as can be performed in a Federal agency. We have the authority to protect the life support system. Now the task is to take that authority and do the job. That requires a great deal of energy and commitment from everyone in this Agency. But the authority is there, the mission is clear, the mandate is strong, and I am convinced that the Agency possesses the capability as well as the commitment. □



The Team Leaders

Four Deputy Assistant Administrators help Thomas Jorling run EPA's massive effort for water quality, drinking water, and solid waste management. They are responsible for a national program of 2,383 employees and \$4.8 billion a year.



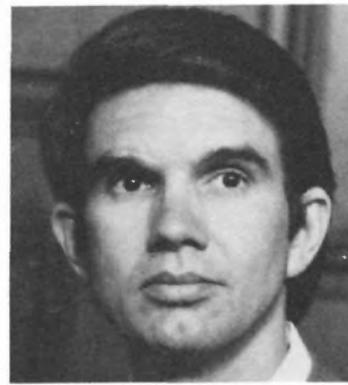
John T. Rhett, Deputy Assistant Administrator for Water Program Operations. Responsible for EPA's multi-billion-dollar construction grant program. Has overall direction and supervision of the Office of Water Program Operations, including the Divisions of Oil and Special Materials Control, Municipal Construction, and Municipal Operations and Training. Before coming to EPA, he was a colonel in the U.S. Army Corps of Engineers. He had served as the Chief of the Engineering Division of the U.S. Army Construction Agency in Vietnam, District Engineer of the Louisville Engineering District, and Resident Member, Board of Engineers for Rivers and Harbors.



Victor J. Kimm, Deputy Assistant Administrator for Drinking Water. Responsible for establishing a national program to protect the public's water supplies and carry out the Safe Drinking Water Act, including the setting of health standards for drinking water. Kimm has previously served as the Deputy Director of the Office of Planning and Evaluation in EPA; a senior executive in the Economic Development Administration, U.S. Department of Commerce; and a licensed Professional Engineer working with industrial waste treatment.



Steffen W. Plehn, Deputy Assistant Administrator for Solid Waste. Responsible for EPA's solid waste management program, under the Resource Conservation and Recovery Act of 1976. The program's aim is to ensure the safe disposal of hazardous and non-hazardous wastes. Conservation and recovery are additional goals, with the Act providing incentives and help to communities and the Federal Government. Plehn has also been the Executive Assistant to the EPA Administrator, Assistant Staff Director with the Council on Environmental Quality, a consultant to the New England Board of Higher Education, and has served with the New Jersey Department of Higher Education and the Office of Management and Budget.



Swep T. Davis, Deputy Assistant Administrator for Water Planning and Standards. Responsibilities include development of water quality criteria and standards, supervision of water monitoring, program direction for State and areawide management of water quality, development of effluent limits for industry, and management of EPA's dredge and fill disposal program. Davis has also served as the Director of the Office of Analysis and Evaluation in the Office of Water and Hazardous Materials, worked in the Office of Planning and Evaluation, and as a consultant for a nonprofit public policy consulting firm.

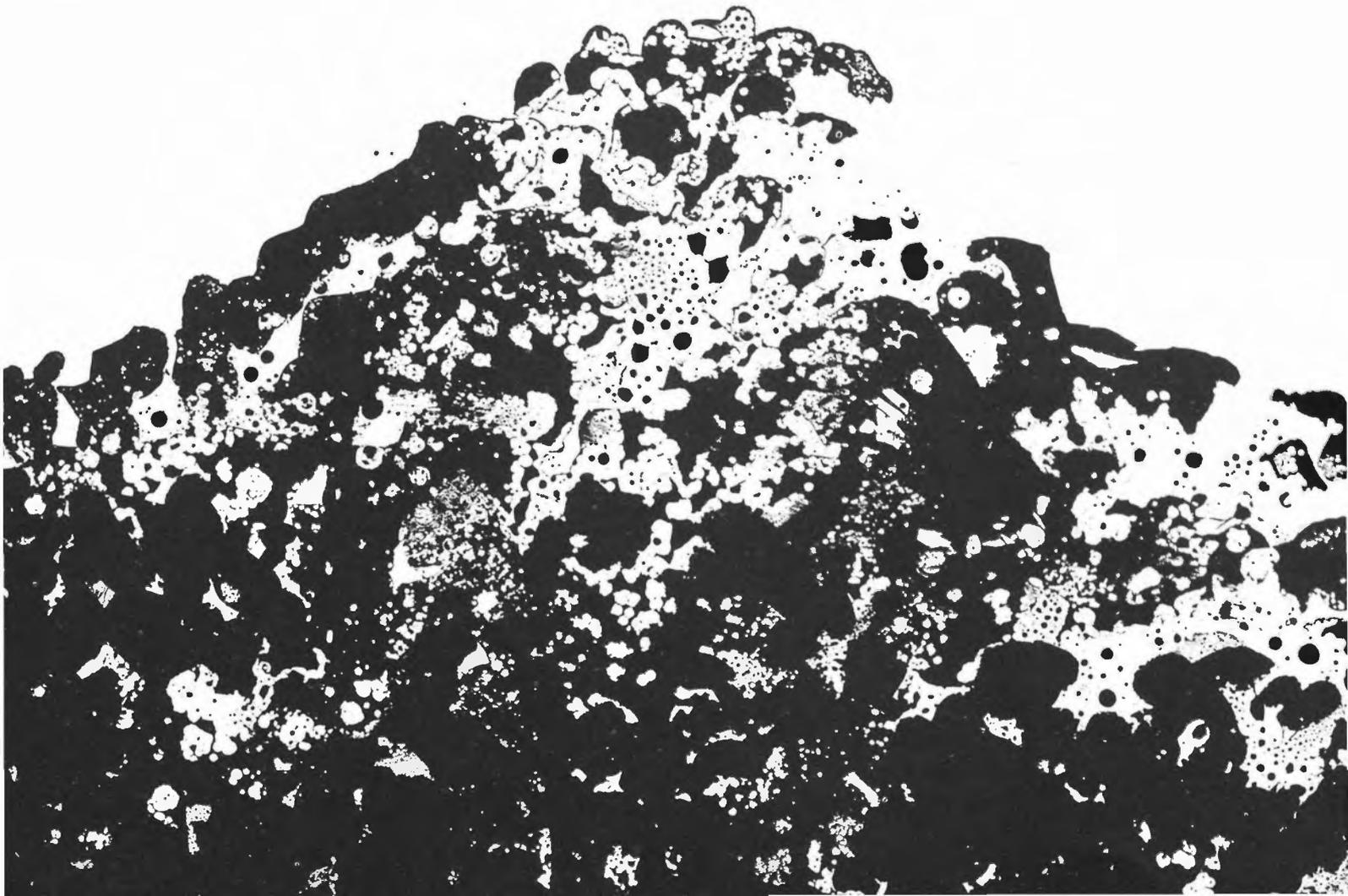
The Mounting Sludge Pile

By John Heritage

Sewage sludge. Is it poison or black gold? Few pretend to have a simple answer to that riddle. But meanwhile, sludge, the residue left after treatment of sewage, is mounting. The Nation's production of five million dry tons of municipal sludge a year is expected to double by 1990.

Says EPA Administrator Douglas Costle: "This could give us all a massive environmental headache if we don't begin to apply ourselves to its solution now."

The Department of Environmental Services in the District of Columbia already has a headache. In a letter to President Carter, a local elected official charged that the Department "is in process of constructing a nuclear bomb of raw sewage at the Oxon



Cove point." The site is being considered for the composting of sludge from the nearby Blue Plains sewage treatment plant.

"This time bomb, which is germ warfare, threatens the lives of every human being in this community and in Washington, D.C.," said the letter writer, Commissioner Maxine Sutton of an advisory neighborhood commission. The heart of her concern was high counts of a fungus, *A. fumigatus*, found in a test composting project which processes Blue Plains sludge.

Rebutting the charge was Dr. Leonor D. Haley, chief, Mycology Training Branch, Center for Disease Control, U.S. Public Health Service. "I cannot believe that the high spore count for *A. fumigatus* at the compost site is an actual health hazard for the community of the D.C. Village municipal home for the aged and the surrounding residential areas," the scientist said in a letter to the EPA Health Effects Research Laboratory in Cincinnati.

Recently, a federal judge ordered the District of Columbia to build a sludge treatment facility. It is to operate temporarily, for a year starting Feb. 15, 1979. The facility would be on a Blue Plains site intended for denitrification, a waste water treatment method. City officials say they intend to appeal the decision.

In another region the Metropolitan Sanitary District of Greater Chicago has a headache too, ironically because it has been recycling sludge.

The Sanitary District, with one of the largest wastewater treatment systems in the country, recycles most of its sludge. Last year, about 614 dry tons a day was distributed for reuse, 71 percent of the total.

Like all municipal sludge, the material has valuable plant nutrients such as nitrogen and phosphorus.

In 1977, some 163 tons of the District's sludge were used daily in southwest Illinois to reclaim strip-mined land and grow a 50,000-bushel corn crop. About 320 tons were given away as a product called Nu Earth. It was used for home vegetable gardens, golf courses, parks, cemeteries, and even nurseries. Some 131 tons were sold out-of-State for uses such as fertilizer in Florida citrus groves.

For nearly 40 years, the Sanitary District has been recycling. Economically, environmentally, it has seemed right.

But then came rising national concerns about cadmium—a heavy metal that can cause kidney disease and possibly cancer. The Chicago District's sludge has relatively high levels of the metal, raising questions about some of the recycling practices. When sludge is used to produce certain crops in the food chain, its cadmium can be

(John Heritage is an Assistant Editor of EPA Journal.)



A composting operation being used by Camden, N.J., after it recently stopped dumping sludge in the ocean is inspected by EPA Region 2 officials. Richard T. Dewling, Region 2 Deputy Regional Administrator, inspects the composting pile. He is accompanied by Eric Outwater, special assistant to the Regional Administrator, and Charles Hoffman, (rear), Region 2 staff attorney. The composting project is designed to turn 65,000 tons of sludge annually into a soil conditioner for landscaping and other non-agricultural uses. This program is being financed jointly by EPA, Camden, the New Jersey Department of Environmental Protection and Rutgers University.

taken up by parts of the plants and passed along to humans as the food is eaten.

Then EPA recently drew attention to another troublesome compound in some of the Chicago sludge—PCB's. These substances—polychlorinated biphenyls—have been implicated in cancer and birth defects. Also found in EPA tests were polynuclear aromatic hydrocarbons, some of which are suspected cancer-causing agents.

Meanwhile, EPA is writing regulations that will affect the land disposal of sewage sludge. Up to now, EPA's pollution control regulations have covered the air and the water, but not the land, where the Chicago District recycles its sludge.

"If the regulations prohibit us from recycling, and air pollution controls prohibit us from burning it, what do we do with it?" asks Bart Lynam, general superintendent of the District. Lynam says he is optimistic that the final regulations will allow the Sanitary District to continue to recycle sludge.

The District is making adjustments though, including a temporary halt to the giveaway of sludge for home garden use, pending the EPA regulations. Many scientists feel that the riskiest sludge use is for

raising home-grown vegetables. Citizens for a Better Environment, a Chicago-based group, has charged that Nu Earth endangers public health.

Washington and Chicago aren't alone. The sludge dilemma is nationwide, as the clean water program produces more and more sludge and as debates flare over possible health effects.

The plight is worse in the big cities. There, the bulk of the country's sludge is generated. There, the problem is made tougher by land shortages, air pollution which may already exceed the limits, conflicts between jurisdictions, and toxic materials from industry and urban runoff.

Coastal cities dumping their sludge at sea face the added pressure of a Congressionally-directed halt by 1981. Ocean dumping is about 15 percent of the Nation's municipal sludge total.

With the regulations they are writing now, however, EPA officials see hope of resolving the sludge dilemma. First, by controlling disposal on land, EPA will be closing the last avenue of sludge pollution.

It has been a step-by-step process. Sludge pollution of surface waters was regulated under the Federal Water Pollution Control Act. Sludge burning was regulated under the Clean Air Act. The ocean dumping is to be stopped under the Marine Protection, Research and Sanctuaries Act. Now sludge disposal on land will be regulated under the Resource Conservation and Recovery Act and last year's Clean Water Act Amendments.

The land controls are "intended to help us close the circle and get off the merry-go-round," said Thomas Jorling, Assistant Administrator for Water and Hazardous Materials. Without restraints in every part of the environment, sludge and other wastes have been passed back and forth, extracted from waste water for disposal on land and shipped from land for dumping at sea.

No form of sludge disposal is free from dangers. While land treatment has its problems, dumping at sea threatens marine ecology and human health. Sludge burning poses risks due to hydrocarbons and high levels of metal in particulates.

The next big question is how to handle sludge when the material can no longer be dumped or recycled anywhere without controls. The challenge is to find a regulatory formula that permits recycling that is safe. Without answers, headaches will continue at Chicago's Sanitary District and for other municipal sludge handlers.

EPA is meeting the issue directly, says Jorling. It is giving first priority to control of the most toxic wastes, which may include some sludge. "We believe we are moving first to protect the public health and welfare. . . ."

Recycling will benefit, Jorling says. The pressure for safe waste management will "drive the process toward resource recovery and conservation options."

EPA is writing two sets of regulations that may affect sludge.

The first will tightly control hazardous wastes from generation to final disposal. Some highly contaminated municipal sludge may be included. The regulations probably won't be issued before late this year.

The second set of regulations will cover the remaining wastes that are not hazardous. Acceptable disposal practices will be set for sludge and other solid wastes. These controls should be final around the end of this year.

Included are proposed criteria regarding sludge's impact on surface water, groundwater, air, control of disease vectors, safety, and protection of wetlands and other ecologically sensitive areas. Sludge use on land for food-chain crops would have to meet additional criteria on cadmium, pathogens, pesticides and persistent organics, and still other concerns.

(Regulations to cover the giveaway or sale of sludge for industrial, commercial, and residential use are expected to be proposed this fall.)

In another step, aimed at controlling toxicants and heavy metals in municipal sludge, EPA recently issued rules to require pretreatment of industrial discharges into publicly-owned treatment systems. When the regulations are fully implemented, sludge from municipal systems will contain far less hazardous residue.

The key questions the regulators are addressing: At what level is sludge too contaminated to use in the production of food chain crops? What technologies can reduce the environmental risk of sludge to acceptable levels? How much will such control cost?

The issue that has raised the most concern is the potential impact of adding some cadmium to Americans' food intake through sludge recycling. Already, officials at the Food and Drug Administration fear that cadmium in the U.S. diet is approaching maximum safe levels. A World Health Organization guideline is being used as the measure.

The cadmium question is complicated. Human exposure to the heavy metal depends on where the sludge is used and for what purpose. If it is applied as a fertilizer to grow certain food-chain crops, its cadmium can ultimately be consumed by humans. When sludge is used on golf courses and other noncrop areas, human exposure is greatly reduced.

The amount of cadmium in sludge varies too. In one city, the level may be high, because many industries with heavy metals in their wastes are discharging into the sewage system. In another city, the count may be lower, because there are few if any discharging industries.

Because of such differences, EPA's regulation writers have a ticklish job. If the cadmium limit is set too high, it could cause health problems. If it is set at too low a level, some sludge uses may be widely prohibited.

With the unknowns and uncertainties, a

key question emerges: How much risk can be taken?

Regulators might set a policy attempting to eliminate all risks to health in the management of sludge. But because there are unsettled questions about health dangers, there would inevitably be some risks. The result? Under the "no risk" policy, no sludge disposal would be possible.

Instead, a policy might be set allowing minimum risk in sludge use. This would allow land application, but with controls designed to keep down health risks and environmental damage.

Two schools of thought have emerged in the risk question.

On one side are many operators of municipal wastewater treatment plants. They believe that spreading sludge on the land should be encouraged. A costly waste can be put to a beneficial use, and it isn't clear there are health dangers, they contend.

On the other side are some environmental and health-oriented groups. They believe land application should be restricted, even if the evidence on the seriousness of the health effects is unclear.

In this complex situation, EPA's success will depend on its ability "to find the optimum balance" between risks, costs, and benefits, declared Bruce Weddle, head of the Agency's Sludge Strategy Working Group.

But preventive measures are also needed, added Administrator Costle. They would remove some of the stumbling blocks to the beneficial use of sludge.

"Foremost among our priorities is the removal of toxics and other harmful pollutants from the waste stream or, even better, preventing their entrance in the first place," the Administrator said.

"We can then use the resulting sludge in environmentally productive ways without fear of contaminating the soil, our water supplies, or crops," he continued.

Industry pretreatment of wastes is one key preventive step. This cleanup-in-advance reduces the buildup in sludge of heavy metals from industry discharges. In addition to its recently-issued pretreatment regulations, EPA is preparing specific limits to control 65 toxic pollutants from industrial wastes.

In turn, the pretreated wastes may be recycled. Some industries are finding they can save money by reusing their wastes. Nickel and chrome are sometimes recovered and reused for electroplating. Other industries may find uses for materials from an industry's pretreated wastes.

Along with new regulations on land disposal and pretreatment, EPA is working in other ways to resolve the controversies and make sludge a useful, acceptable material. The effort is strengthened by the Agency's high priority for recycling and reclamation.

Continued on page 37



Steam rises from a composting sludge pile that is being mechanically mixed with wood

chips at a site run by the Maryland Environmental Service.

River Magic

Now comes the time of year when the pleasures of water are fulfilled.

On the Atlantic and Pacific coasts, breakers roll in and swimmers shout excitedly as they prepare to dive under or jump through the ascending wall of water about to boom on sandy beaches.

As the foaming tide recedes back into the sea, toddlers run to splash in replenished tidal pools. Older children scramble down the beach with their rubber mats and surf boards to catch the curl of the next incoming wave.

Yet while the gifts of the seashore will always be cherished, millions of people find their summer enjoyment in swimming, fishing and boating in creeks, lakes and rivers.

The lure of clean natural waters pulls people past "no trespassing" signs, deafens them to warnings of danger, and fortifies them against such annoyances as gnats, mosquitoes, and poison ivy.

The explanation is simple. Most rivers are enchanted. While some, like the Potomac, are lazy in their tidal sections, in their upper reaches they are usually lissome, frolicsome, beguiling and irresistible.

An easy way to find out about river magic is to take the Chesapeake and Ohio Canal along the Potomac. The canal tow path travels through a great outdoor cathedral lit by dappled sunshine filtering through towering sycamores, elms and oaks, festooned with great looping wild grape vines.

Sanderlings, small birds noted for their rocking gait, totter along the river bank. Muskrats can occasionally be seen furtively swimming in the shadows. Canary yellow goldfinches flit by on one of their roller coaster flights.

The river, sometimes languid but more often feisty, splashes over its rocky bed and provides hundreds of pools and sheltered areas where swimmers bathe along the shores.

Below the junction of the Potomac and the Shenandoah Rivers at Harpers Ferry excited adventurers jammed in large rubber rafts suddenly appear, swirl downstream, and bounce through a series of rapids before landing in calm water again.

These are some of a growing number of people who shatter the monotony of their daily lives by taking a guided river voyage.

Elsewhere around the Nation white water enthusiasts are canoeing, kayaking, or riding rubber tubes in turbulent stretches of such rivers as the Snake and Rogue in Oregon, the Snoqualmie in Washington State, the Chattahoochee in Georgia, and the Youghiogheny in Maryland.

The laughter of swimmers can be heard above the Buffalo River in Arkansas, Lake Winnepesaukee in New Hampshire, and the Pedernales River in Texas.

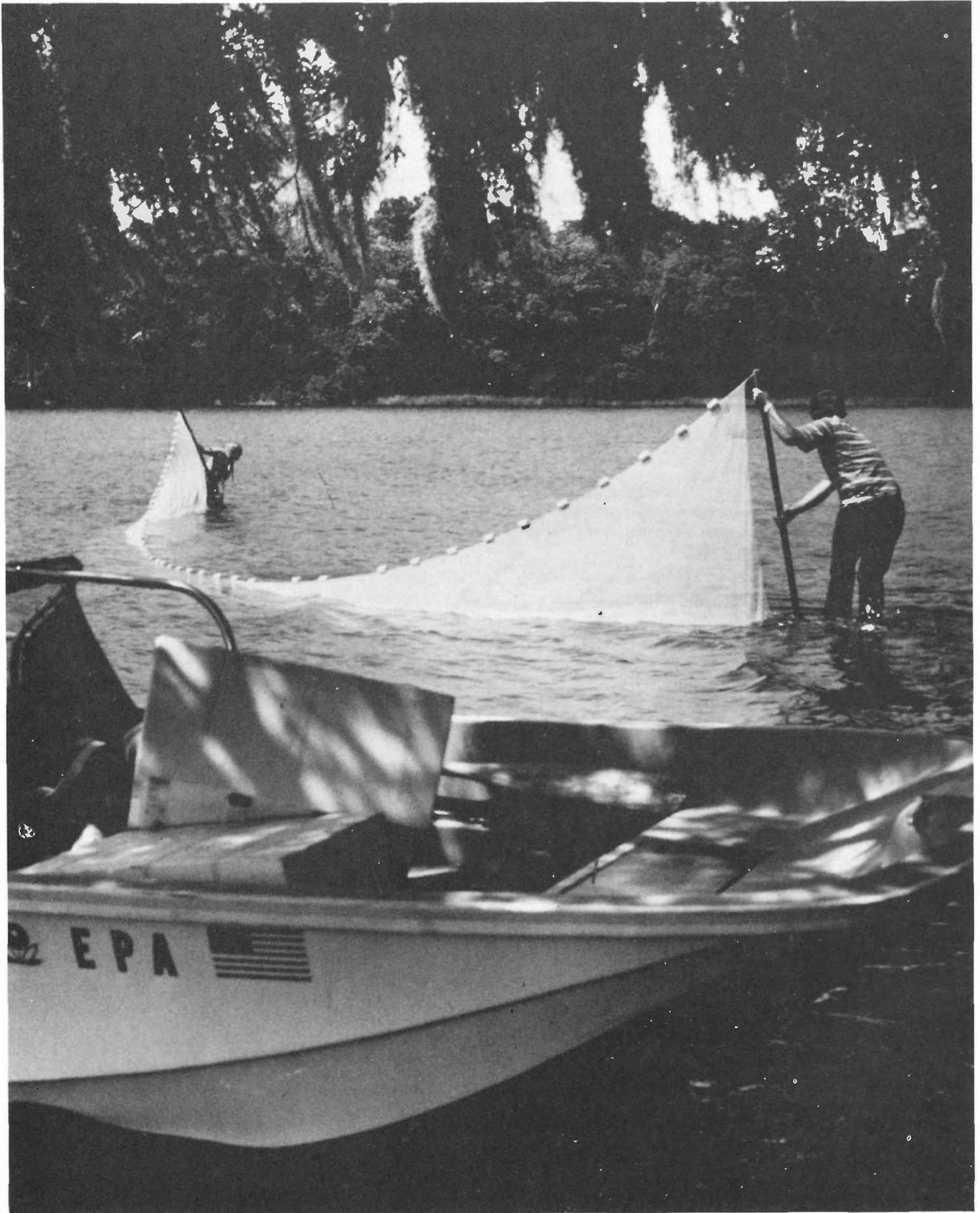
Each summer fishermen explore the waterways in their area with fresh hope of a mammoth catch. At night camp fires often flicker along stream and river banks as some continue their quest long into darkness.

Many of us have fond memories of quiet river scenes—of a heron suddenly rising from a green marsh, of sailboats gently knocking against a wooden wharf in choppy water, and of evening cruises with fireflies sparkling in the night.

The timeless appeal of peaceful river life was captured by Mark Twain in the following comment by Huckleberry Finn about a raft trip down the Mississippi River:

"We caught fish and talked, and we took a swim now and then to keep off sleepiness. It was kind of solemn, drifting down the big, still river, laying on our backs looking up at the stars, and we didn't ever feel like talking loud, and it warn't often that we laughed—only a little kind of a low chuckle. We had mighty good weather as a general thing, and nothing ever happened to us at all."—C.D.P.





Around noon on April 15, 1977, a two-engined plane bearing State of Kentucky insignia landed at Pensacola Municipal Airport in Florida and taxied up to Hangar Number One, where private planes are housed.

The two pilots carried three cardboard boxes inside and signed a log sheet with Patrick W. Borthwick, an EPA research biologist, establishing that custody of the boxes had been transferred.

Borthwick quickly loaded the boxes into the trunk of his government-owned sedan and drove south through the City of Pensacola and across a causeway to Gulf Breeze where EPA's Environmental Research Laboratory is located. A magnolia at the entrance to the lab was bursting into bloom.

Borthwick had no time to admire the setting, however, for this was an emergency. Inside the boxes were gallon jars containing samples of sludge that had made 32 workers ill at a Louisville, Ky., municipal sewage treatment plant.

Mystery hung over the whole episode. What was in the sludge? How did it get there? And what would be the best way to dispose of the stuff—dump it at sea, incinerate it aboard a special ship, or place it in some special landfill?

Scientists at the Gulf Breeze facility began work at 2:30 p.m. the same day to test the evil-looking substance. Since the U.S. Public Health Service already had warned that the sludge was a Class D poison, capable of releasing both phosphine gas and hydrochloric acid under certain conditions, the workers drew off samples in the open air outside the lab.

"It looked very dark, like suspended motor oil from a car crankcase," Borthwick said afterwards. "We took rather elaborate precautions with it."

In the next few days the Gulf Breeze staff ran a series of bioassays, using live marine organisms to test the potency of the sludge. Since their primary mission was to find whether the

poison could be disposed of at sea, they poured small quantities of it into various tanks of seawater containing five kinds of sea life: mysid and grass shrimp, sheepshead minnows, tiny crustaceans known as copepods, and microscopic algae called diatoms.

The sludge was indeed toxic to marine life. Tests showed the mysterious substance was fatal to half of all the copepods in a concentration of 25 parts per million of sea water. In other words, one drop of it in half a gallon of sea water would kill 50 percent of this test species. In larger quantities it was also deadly to numbers of the other sea life.

In addition, researchers concluded the sludge contained substances that would bioaccumulate in marine life, a threat to the food chain involving larger fish including those caught for the marketplace.

Within two weeks an analysis and report were on the desk of the Administrator for Region 4. Based on these and other findings by EPA scientists at the Athens, Ga., laboratory, it was decided that at-sea disposal of the sludge was an unsafe method to use. In the meantime, investigators came up with an explanation for the mystery: The driver of a truck was charged in Louisville with illegally dumping two potent poison wastes, hexachlorocyclopentadiene and octachlorocyclopentene, into the city's sewage system, and the chemicals eventually flowed into the treatment plant where they made workers ill.

In a letter of commendation to the Gulf Breeze laboratory, the Regional office complimented the staff for its prompt response in a potentially grave public health problem.

The episode illustrates the ability of the Gulf Breeze laboratory to examine toxic materials using marine organisms. It is one of three EPA laboratories that at any given moment can provide a broad range of sensitive aquatic animal and plant

species for so-called bioassay or "live" tests of poisonous substances. (The other two laboratories are at Narragansett, R.I. and Duluth, Minn.)

By gathering these species from surrounding bays and lagoons and keeping them alive in special holding tanks for tests, scientists have been able to study in the laboratory the way marine life would react in nature to suspected poisons that may be contained in pesticides, or other chemical compounds released to the environment.

The Gulf Breeze laboratory is located on a small promontory, shaped somewhat like a tennis racket, looking north across Pensacola Bay to the city made famous by generations of Naval fliers and Hollywood films.

The visitor approaches across a narrow bridge to the 15-acre site, known as Sabine Island, which reputedly was created in 1876 by ballast dropped from ships. Sabine Island is truly international; the ballast includes 60 different kinds of rocks including Mediterranean coral and broken red roof tile that apparently came from Marseille.

The headquarters for the EPA facility originally was built at the turn of the century as a quarantine station. Its low profile and Gulf Coast hipped-roof cottage shape are designed to cope with the occasional hurricanes that sweep over the area, and its long verandah and white open railings serve to catch the Gulf breezes and keep occupants shaded in the hot months.

By 1925 the quarantine station had outlived its usefulness and it was abandoned by the Treasury Department. However, it enjoyed a renaissance in 1937 when the Commerce Department's Bureau of Fisheries converted it to a marine laboratory serving the Gulf fishing industry. The facility changed hands again in 1948 and became part of Interior's Fish and Wildlife Service until 1970 when it came under EPA jurisdiction.

Continued on page 38

Aquatic Research on the Gulf

By Truman Temple

EPA employees seine for shrimp near Pensacola, Fla. Their catch will be tested for PCB's.

Truman Temple is Associate Editor of EPA Journal



Some years ago a landowner in Massachusetts was told by the Federal Housing Administration that his land along the Nashua River had "no value" because the river was so polluted.

Much of the land along the rivers and lakes of the Nation had been kept from residential or industrial development precisely because these water bodies were so foul and unpleasant that no one wanted to locate near them.

Congress responded to the public call for action by enacting sweeping amendments to the Federal Water Pollution Control Act in 1972, which set

Sharon Francis is a special assistant for public participation to the EPA Administrator. This article is excerpted from a booklet that she co-authored with Richard DeSanti, a consultant. The book, "Opportunities For Water Cleanup and the Land" will be published by EPA late in 1978.

Who Will Inherit the Clean Water?

By Sharon Francis and Richard DeSanti

a goal of waters clean enough for fishing and swimming by 1983. New amendments incorporated in the Clean Water Act of 1977 provided additional funding and guidance to continue the cleanup of the Nation's waters.

This landmark legislation carries economic as well as health benefits. As rivers and lakes become more esthetically pleasing, the land bordering them will become more attractive for various types of devel-

opment. But without proper planning, if the public is not alert to the implications of water cleanup, it could be deprived of access to areas that have been improved through Federal tax expenditures. In other cases, careful planning is necessary to prevent land use from contributing to erosion, runoff, or new discharges of pollutants.

Land that lies along improving waterways can be protected now, for the enjoyment of a majority of Americans, through Federal, State, and local open space programs. Public money allocated for recreation and water cleanup programs can be stretched through proper planning and imaginative ideas for coordinating this spending.

Plans to achieve these goals started at a Boston Conference in 1975, sponsored by EPA, the Department of the Interior, and the Conservation Foundation. The two Federal agencies agreed to coordinate their activities to get the most out of both parks and antipollution

efforts in New England. EPA's Boston office published a brochure "Multiple Use of Waste Treatment Facilities and Rights of Way," alerted communities to opportunities for recreational development at water treatment facilities, and held workshops to acquaint engineers with multiple use designs. Interior and EPA have since expanded their cooperation nationwide.

There are four basic strategies for obtaining the most from each water cleanup dollar:

Multiple Use. Recreation facilities can be developed with wastewater treatment facilities. For example a trail system can be built along sewer lines and boat launching ramps can be set up on available land at a treatment plant.

Joint Development. Water treatment and recreation facilities can be constructed simultaneously, for example, by building a park around an artificial lake filled by clean water from a treatment plant.

Coordinated Acquisition.

State and Federal land purchases can be synchronized with pollution control schedules so waterfront land is bought before it becomes cleaner and more expensive.

Greenways. Extensive corridors of open space and recreation land can be developed along waterways.

Communities that want to obtain recreation and land use benefits must operate within the framework and deadlines of laws set by Congress. Citizens and officials must work together to take advantage of opportunities. Environmental and hiking groups, sports associations, chambers of commerce, fishing and hunting clubs, and community service organizations can encourage government officials and the general public to define priorities and ensure adequate funding. Planning can take place at many levels; local, State, and Federal, depending on the situation.

At whatever level action is attempted, participants must take these basic steps: determine the schedule for water cleanup by examining the State priority list for municipal wastewater treatment funding or consulting 208 planning agencies; survey recreation and open space opportunities along waterways by taking field trips and examining land use plans and zoning maps; identify available public and private programs for land preservation, and determine their requirements; match up the timetable for water pollution control with the opportunities for open space and recreational land; find out which land parcels should receive priority consideration; and, finally, develop a plan of action that can be implemented by an organized constituency.

A fine example of coordinated acquisition can be found in Lowell, Mass., which suffered from declining industry and a deteriorating inner-city until it developed the concept of an "urban cultural park" to pump new life and economy into the city. The plan emphasizes the location of the city on the Concord and Merrimack Rivers and its legacy of long brick mill

buildings and a network of canals. The canals are being restored, and undeveloped banks of the rivers will be protected. The mill buildings are being converted into offices and shopping malls. Lowell's strategic location offers it the potential of becoming an inland boating center.

At the Tallmans Island wastewater treatment plant in Queens, New York, planners purchased more land than was immediately needed to allow for future expansion. Instead of

will be one of the largest urban park developments in the country. It will contain 1,350 acres of parkland, six and a half miles of lakes, and twenty miles of trails. The project began back in the 1930's when wastewater effluent from the Lubbock treatment plant was used to irrigate local cropland. The percolation of wastewater through the natural filter of farm soil built up the water table, and local authorities realized that this underground resource made further uses possible.



This trash-strewn dock is typical of many neglected waterfront areas across the country.

letting the land lie vacant they used excavation material left over from construction to landscape a park. A pier needed for the docking of sludge barges has been opened for fishing as well. The engineering firm worked with the New York City Arts Commission on the design of the treatment facility, and with the Brooklyn Museum to preserve artifacts found on the site as sculptures in the park.

Joint development projects are especially desirable where water resources are scarce or in areas where waterfront land is limited. These projects require more substantial modifications by wastewater treatment agencies and greater participation by recreation agencies. A clear understanding of planning, design, financing, construction, and management responsibilities should be worked out before the project begins.

Joint development is being used in the Yellowstone Canyon Lakes Project in Lubbock, Texas, which when completed

Land for the park is being acquired with the help of the Department of the Interior and the Department of Housing and Urban Development.

Wastewater treatment plants can also serve as a source of environmental education. With large numbers of people becoming interested in treatment processes as communities across America act to control their wastewater problems, there is an increasing need to incorporate educational opportunities into treatment plant design. Some plants have organized tours led by staff people at regular intervals. The Washington Suburban Sanitary Commission has trained interested citizens in the operation of its plant in the Maryland suburbs. These volunteers conduct a program on a part-time basis.

In some cases educational features can be built in during construction that are less expensive to maintain and operate. The wastewater treatment

plant in Shenandoah National Park in Virginia uses a series of roadside signs to prepare visitors for their self-guided tour of the facilities.

Establishing a greenway is the most comprehensive way to take advantage of clean water opportunities. A greenway is ideally a continuous belt of open space along a waterway, with a network of trails and occasional parks for recreation. Many variations are possible. For example, the greenway could be limited to the width of a trail in some areas or could be a series of interrelated but separate miniparks.

Greenways can be established through easements or land use restrictions, and can even include commercial development when the existing character of the waterfront cannot be changed.

A pioneering greenway effort has taken place on the Nashua River in New Hampshire and Massachusetts. Beginning in 1969, the Nashua River Cleanup Committee, which had been working to improve the water quality, evolved into the Nashua River Watershed Association, dedicated to cleaning up pollution and preserving land along the river.

The Association has worked to establish a belt of open space at least 300 feet wide along the river and its major tributaries. So far 1,000 of the 4,300 acres within the greenway have been protected from development, providing a 56-mile ribbon of open field, forest, floodplain, and marshland that contains diverse wildlife habitats and provides major esthetic enhancement. Other benefits to the region include erosion prevention, improved water quality, and fewer expenses for flood control.

Taking advantage of greenway opportunities will ensure that the land uses along the Nation's waterways contribute to, rather than work against, the goal of clean water. Waterway recreation development can provide economic benefits for urban areas and ensure that the benefits of Federal clean water programs go not to a select few but rather to all the citizens who paid for those programs through their taxes. □

How does one get a traditionally independent group of people, the farmers, to recognize the water quality problems associated with farming? An even tougher question to deal with is, once they recognize the problem, how does one convince them to voluntarily undertake effective, but sometimes costly control measures? These are but a few of the difficult questions that I faced when I became Director of one of the Nation's first 208 programs in New Castle County, Delaware.

At that time, four years ago, there was little guidance available. Initially in meeting the objectives of the Federal Water Pollution Control Act of 1972, EPA program leaders developed a 208 program emphasizing areas which had water quality problems as a result of urban-industrial concentration. Little did they realize the eventual major involvement the program would have with the agricultural community.

As head of the New Castle County's Water Resource Planning Division, I was well aware of the point source contributing to water pollution from the existing urban-industrial complex. New Castle County, located in the middle of the corridor between Philadelphia and Washington, is the site of major research facilities for several chemical corporations. However, few people recognize that a rural intensive farming community exists in Delaware. The southern two-thirds of the three-county State is economically dependent upon its agricultural activities; so much so that when one proceeds south of the Chesapeake-Delaware Canal into the rural section of New Castle County, it is much like entering a different realm. So different in fact, that at times the residents have threatened to secede from the county and join the more agriculturally oriented counties to the south.

Merna M. Hurd is Director of EPA's Water Planning Division. Prior to that she headed a clean-water planning program in New Castle County, Del.

Our first step was to evaluate existing water quality and determine the various pollution sources. We had previously identified our point source problem and had developed an active program of constructing and operating treatment plants. Using the limited water quality monitoring data we had available, we were able to determine that agricultural runoff was a major contributor to our water pollution problem as well.

Further verification as to the extent of this problem was obtained through visual documentation. Tramping around the county in boots with the Soil Conservation Service District Conservationist, my staff witnessed the severe erosion problems first hand. Sediment control is one of the keys to improved water quality. While sediment alone causes water quality problems, it also acts as an agent in carrying fertilizers, pesticides, and other chemical hazards into waterways. The Agricultural Extension agent, who had been along on some of the treks, stated the erosion

problem was at the worst level he had seen during his 30 years with the county. He cited Noxontown Pond as an example of water quality deterioration. Less than 10 years ago *National Geographic* had run a photo spread of Noxontown Pond as an example of beauty in a small pond. At the time, there was very little development in the basin. Later a private school bought the surrounding land and leased it to tenant farmers. Today the pond is badly silted and exhibits all the characteristics of a eutrophic lake; excessive weed growth and algal blooms. All this is a direct result of erosion from farming.

I was surprised at the severity of erosion problems on farmlands. With institutions such as the Soil Conservation Service and the National Association of Conservation Districts (NACD) why do these erosion problems still exist? There are a number of reasons. For example, farmers now have increased their farm holdings, and the amount of cultivated acreage is greater than in previous years. In order for farmers to remain self-supporting, they have been forced to change their agricultural methods. The use of large machinery, the development of continuous row-cropping plus the economic need for higher levels of productivity all can potentially lead to greater erosion. Even if the farmer recognizes the problem, he often sees it as a long term non-productive cost item in a competitive short-term market.

NACD and SCS have for more than thirty years been advocating increasingly sophisticated and effective means of conservation. Although participation by farmers in the development of soil conservation plans has been high, there are insufficient resources to provide cost sharing for implementation of these plans. Additionally, there are not enough personnel to spend an adequate amount of time with each farmer. In New Castle County alone, the District Conservationist is responsible for 930 farms as well as his other duties.

Absent landowners also contribute to the problem. Their interest in farmland is often speculative. While waiting for suburbanization to occur, they often lease their land one year at a time for farming. In these cases, neither the landowner nor the tenant farmer has any incentive to protect the land.

Having grown up in Nebraska, and having worked as a consultant in the Midwest, I know how independent farmers are. I also appreciate their open, honest, direct approach. We determined early in our water quality management program that the best way to get our water quality message across was through the existing structures; NACD, Extension Service, and SCS. We began to attend meetings of farm groups wherever we could find them. Of course, there was some initial distrust. We were looked upon as intruding into their business. The south canal area has always taken pride in being known as 'No-government man's land'.

With time our newly-found communication channels started paying off. We were able to tell them what we were about and they were more than willing to share their general opinions with us. We observed their frustration over government control, especially the red tape and numerous forms involved in the permit programs.

I knew we were making progress when after one meet-

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Planning for Clean Water

By Merna M. Hurd



Treatment for Small Communities

By Keith H. Dearth



Many of us grew up in small towns where cesspools and septic systems had made indoor bathrooms possible. In some areas soil conditions, poor construction, or lack of periodic maintenance resulted in failures of these systems with subsequent pollution of ground or surface waters and health hazards.

In other communities along the seashore, lake and river fronts, or near farmlands, the convenient disposal method was the direct sewer outfall, even more likely to produce pollution and health problems.

Under the 1972 Amendments to the Federal Water Pollution Control Act, grants have been

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used to help solve these nationwide problems. Unfortunately, in some cases the costs to local users of the new systems built under this program have been heavy. Often alternative methods of handling the waste water were not considered adequately in the planning stage.

In some instances, the local share of costs has made the payoff by the users extremely difficult if not impossible. In others, the new facilities have been oversized and too sophisticated, creating large and difficult operations for small, often remote communities.

For over two years EPA has been conducting a program to eliminate these problems.

The Agency has learned that some less densely populated communities cannot afford the costs of conventional sewer and treatment facilities. More economical, properly designed septic and other on-site systems, constructed in adequate soils and with suitable ground-

water conditions, if properly operated and maintained, function very well almost indefinitely. Very few failures have been noted where conditions are favorable and where centralized control of on-site systems is efficiently administered.

In other instances, areas where on-site systems are not environmentally acceptable or do not meet the requirements of the law may rely on piping septic tank effluents by small-diameter gravity or pressure sewers. These small flow systems are eligible for grants and are encouraged where appropriate. An example in Louisiana is use of the individual home, or cluster-unit lagoon to receive piped septic tank effluent where soil absorption beds will not function.

Many small communities can now satisfy Federal standards with such treatment ponds

or lagoons. The use of such ponds, when combined with land application of the effluent, meets the zero discharge requirement of EPA's program.

Let's take a look at some examples of how lack of planning can bring excessive costs. One location, "Community A," was informed as early as the 1930's by the State health authorities that privies, direct outfalls, cesspools, and malfunctioning septic systems would have to be eliminated for public health reasons and because of contamination of the large, beautiful lake nearby.

Over the years several engineering studies were made but sufficient funds to accomplish the task were not available until the 1972 Amendments on water quality. Under this legislation a 75 percent EPA grant, and 25 percent subsidy from the State paid for the entire new tertiary treatment plant that subsequently discharged into

the lake. The Farmers Home Administration (FmHA) and the Economic Development Administration provided grants to pay for most of the conventional gravity sewer collection system with its many manholes and pumping stations and minimum 8-inch pipe. Only 6 percent of the capital cost of the collection system had to be carried by the community and even that was financed with a long-term, low interest loan from FmHA.

But when plant operation and maintenance costs and debt retirement costs showed that sewer charges per user would exceed \$200 annually after initial costs ranging from \$1,000-\$1,500, for connecting individual homes to the new sewer lines, some citizens refused to hook in. Some of those who did connect with the system refused to pay the monthly charges, and others petitioned the local court for injunctions to prevent the local sewer district from requiring them to connect since their septic tanks were not malfunctioning.

An EPA study team looking into the problem found that the new plant was approximately double the required size and that it could not meet specifications as designed and constructed. A new facility plan has been prepared that examines alternative courses of action. The course selected is to treat the waste water in a lagoon and then spray it on the land, thus eliminating direct discharge into the lake.

At approximately the same time at Priest Lake, Idaho, a similar pollution problem was solved by using small-diameter pressure sewers to pick up the effluent from septic tanks and deliver it to a lagoon for treatment. Though the community is paying for 50 percent of the capital cost compared to the 6 percent raised by "Community A," total sewer charges cost each family only about \$11 monthly. Original capital costs for the system were just 8½ percent of the estimated capital cost for a conventional collection system such as that constructed for "Community A."

Subsequent pressure systems constructed for Glide/Idleld Park, Ore.; Port Charlotte, and Port St. Lucie, Fla.; and designed for other projects indicate pressure sewers in rocky or difficult terrain cost only one-eighth to one-half as much as conventional gravity sewers. Another benefit is the lower cost to the environment since large trenches and strict line and grade control manholes and large lift stations are not required for pressure sewers.

In another instance, "Community B" discovered in time that its new project would be too expensive, even though the seven-year bond issue to cover the nearly \$2 million local share has been sold and the contract has been let for the construction of a new collection/interceptor network.

Though only 1,500 people live in the township, the new regional system is capable of serving 15,000 people. The result is that families are being called upon to pay for the construction of a system that can serve 10 times as many people.

At public meetings, township supervisors have been physically attacked and two have resigned. Through a special election two new supervisors opposed to the project were elected and the entire sewer authority was replaced. The new authority refuses to obtain the rights-of-way for the sewer line, so the project cannot proceed. Suits are threatened by the contractor who cannot begin work and by the adjacent communities who are bearing the entire cost of the new regional facilities until "Community B" connects to the system.

EPA, in providing technical assistance to the community, has recommended eliminating collection sewers for rural areas, restructuring the finances to eliminate the bond issue, incurring a long-term FmHA loan, and releasing the contractor from his contract. Litigation to recover the damages and contractual liabilities incurred from responsible third parties was also recommended.

The Agency also recommended that the balance of the township where sewers were no longer planned should be part of a special sewer district. An operation and maintenance program would be set up there for existing on-site wastewater treatment systems after upgrading any that were malfunctioning.

Apple Valley, Calif., has also faced required high-cost sewers in a sparsely-populated area. It overcame the problem by planning for a portion of the area to be under central management of the existing on-site wastewater treatment systems. Wastewater from the remainder of the area will be collected by small-diameter pressure sewers. Considerably lower capital and operation and maintenance costs will result.

The plan for Fountain Run, Ky., which calls for small-diameter gravity sewers to carry effluent from septic tanks to suitable subsurface disposal areas, will result in monthly costs approximately one-half the costs for conventional sewers and central treatment. This is the case also for a similar project in Westboro, Wis., whose population is essentially elderly retired persons on low incomes.

Economic difficulties in small communities were recognized by the Congress in the Clean Water Act of 1977. Grant funding eligibility has been extended to the construction of privately-owned treatment works serving one or more principal residences or small commercial establishments. Restrictions to these grants will be spelled out in the EPA regulations now being written to implement the law.

Beginning in October, the Act will also provide for a set-aside of four percent of the grant funds allocated to each rural State to be available only for alternatives to conventional sewage treatment works for municipalities having a population of 3,500 or less or for highly dispersed sectors of larger municipalities. The Governors of non-rural States may request a similar set-aside of 4 percent or less, but it is not compulsory. Where a project

calls for innovative processing or techniques, it may be eligible for an 85 percent grant rather than the standard 75 percent grant.

EPA's experience has been that making grant funds available to conventional systems and excluding individual systems has created an incentive to plan only for conventional systems.

By making individual systems eligible for grants, this incentive will fortunately be eliminated. Eligible individual systems include treatment in septic tanks and disposal in soil absorption fields, dual systems with waterless toilets (including those with composting tanks) and grey water treatment and disposal facilities, other on-site units, small systems serving clusters of households, and pressure, vacuum and small-diameter gravity sewers. Also eligible for a grant is the acquisition of property for land treatment or ultimate disposal of septage or sludge.

In addition to increased EPA incentives for such alternatives to conventional waste treatment plants, other funds also are available. The Department of Housing and Urban Development has block grants that can be used for all but treatment plants. Various loans, grants, and loan guarantees are available from the Economic Development Administration, the Appalachian Regional Commission, the Coastal Plains Regional Commission, the Coastal Energy Impact Program, and the FmHA Rural Housing programs. Revenue-sharing funds can now be used as matching monies for Federal grants. Last-resort funding for the local share is available through the EPA/Federal Financing Bank Loan Program.

The new Act and the many measures being taken by EPA, such as seminars to advise those concerned about the place of on-site and small systems in our program, should result in the best and most carefully engineered projects to meet specific local, State, and Federal requirements at minimum cost both economically and environmentally. □

The Army Enlists For Environmental Battle

The Environmental Protection Agency and the U.S. Army Corps of Engineers have signed an interagency agreement whereby the Corps assumes a new mission in support of EPA's wastewater treatment construction grants program. In accordance with the agreement, the Corps is assisting EPA in reviewing and inspecting the construction of hundreds of new sewage treatment plants across the country.

Noting that this multi-billion dollar construction program is one of the Federal Government's largest, EPA Administrator Douglas M. Costle said the Corps of Engineers' help "will give EPA more time to de-

vote to environmental aspects of the construction grants program."

Lt. Gen. John W. Morris, Chief of Engineers, said the Corps "welcomed this opportunity to assist EPA in this construction effort to improve the quality of the Nation's waters in years ahead. Under this agreement the Corps will be able to bring its long experience in water resources management to bear in this critical area."

On March 8, 1978, less than two months after the agreement was signed, a pilot program was approved by Adlene Harrison, EPA's Region 6 Regional Administrator, and the Corps' Southwestern Division Engineer, Brigadier General James C. Donovan. They noted that one reason for the pilot program in Region 6 was the size and diversity of the Region's grants program. Grants have been provided to communities ranging in size from Dime Box, Tex., (pop. 300) to the gigantic Dallas-Fort Worth area.

This unique interagency partnership will build on a management system established by EPA to track the expenditure of Federal dollars to construct waste treatment plants.

In the arrangement, the Corps reviews treatment plant plans and specifications submitted by cities and other jurisdictions to EPA and inspects the construction of those plants. Although responsible for providing guidance and making recommendations, the Corps has no authority either to approve or disapprove a grantee's plans and specifications of actual construction.

Fundamental to the interagency agreement is the concept that the grantee is ultimately responsible for the technical integrity of the project and sound fiscal management of grant funds. It is the Corps' job to determine whether the grantee is fulfilling those responsibilities.

As specified in the regional agreement, EPA Region 6 retains final responsibility for all aspects of the construction grants program. Corps activities conform to EPA regulations, policies, and guidelines.

The Southwestern Division provides three major services: (1) Reviews grantees' plans and specifications prior to advertising; (2) Provides inspection by a resident engineer on construction projects costing \$50 million or more,

and (3) Inspects construction work and advises grantees and EPA of the status of construction, including deviations from plans or specifications, and quality and timeliness of work.

The Southwestern Division Headquarters, in Dallas, is the contact point for the Corps with EPA Region 6. Because Corps District boundaries are determined by river basin boundaries which do not necessarily follow State lines, often more than one Corps District will be found in a single State. To facilitate matters for the Corps-EPA Program, a single Corps District Office has been assigned Corps program responsibilities for each State.

To meet its manpower needs for the program the Southwestern Division has reallocated 40 job slots. The Division expects to assign additional personnel to this program in future years as the workload climbs.

The Corps program began April 1. In the first month, the Corps conducted 104 inspections on construction contracts, one review of proposed plans and specifications, and conducted three pre-construction conferences with EPA, grantees, and contractors. □



Representatives from EPA and the Corps of Engineers review plans for a wastewater treatment plant in Arlington, Tex.

Clean Lakes

Slowly yielding to the insistent pull of the tractor, the stump relinquished its hold on the mucky lake bottom. Debris-laden water swirled into the hole and rippled around the trunk as it was pulled toward shore.

Three hundred people watched the ripples fade away and knew that their vision of a clean, usable lake was one step closer to reality. The submerged stumps along the eastern shore of Collins Park Lake in upper New York State had threatened to block restoration of the lake adjacent to a long-established picnic area until residents organized a volunteer "stump pull."

Local enthusiasm is a vital ingredient for success in all of EPA's "clean lakes" projects.

Over a number of years, recreation suffered because of abundant aquatic plant growth and sediment accumulation in Collins Park Lake. Ultimately, State, local and Federal governments combined their resources to restore the water quality and recreational value of the only publicly-owned lake in Schenectady County, N.Y. Their plan involved the removal of bottom sediments through dredging, the construction of a sediment basin, and the relocation of leaf and snow disposal sites. Dredging will remove years of accumulated bottom sediments which provide footing and nutrients for aquatic plants, while the sediment basin will capture incoming sediments and their associated nutrients. Relocation of the leaf and snow disposal sites will eliminate those nutrient sources.

Nearly seventy lakes have benefited from EPA's Clean Lakes Program. Initiated in



Volunteers used this truck to pull stumps out of the lake bed as part of an EPA-sponsored clean lakes project.

1966 by Senators Walter Mondale (D-Minn.) and Quentin Burdick (D-N. Dak.), the legislation authorizing the program was incorporated into the Federal Water Pollution Control Act Amendments of 1972. Section 314 of the law requires the States to report on the water quality of their freshwater lakes and authorizes funds to help States take action to restore the water quality of those lakes. The program is being closely coordinated with other agency efforts.

Arguing in support of the clean lakes section during Senate debate on Capitol Hill, then-Senator Mondale pointed to "the evidence that many of the Nation's fresh water community lakes are now being victimized by municipal and industrial pollutants, agricultural runoff, and accelerated sedimentation." Although his comment was based on the large number of lakes in Minnesota, he noted that "there is not a State in which the water quality of lakes is not seriously degraded."

Since it began in 1975, the Clean Lakes Program has spent about \$25 million on restoration projects around the country. This does not include EPA funds for municipal waste treatment plant construction on lakes. EPA spent \$514 million in FY 1977 for its cleanup efforts for the Great Lakes. This includes treatment plant aid but not other Great Lakes spending by EPA regional offices.

In order to be eligible for a clean lakes grant, a lake must have public access and use, must be classified as freshwater, and its advocates must show that their restoration plan has a high probability of long-lasting benefit.

Few sure cures are available to aid planners in developing comprehensive, effective restoration plans for ailing lakes. The entire field is so new that researchers are still unable to predict consistently the effect of a particular technique on a lake. This situation is complicated by the uniqueness of

each lake and its watershed. For example, both Buckingham and Washington Park lakes in New York were dredged to remove accumulated organic-rich sediments. One year after completion of these projects, Buckingham Lake shows no significant improvement in water quality while Washington Park Lake is clear and has fewer aquatic plants.

EPA's Office of Research and Development is involved in an intensive study of several clean lakes projects. These projects were carefully selected to yield the broadest possible data base on both the limnological and socio-economic aspects of lake restoration. Their goal is to be able to predict accurately and consistently the effect of a restoration technique on a particular lake.

Presently, though, planners rely largely on data generated by university research, and through State, local and Federal lake programs here and in other parts of the world. All projects supported under the Clean Lakes Program have monitoring and reporting requirements so that as the program matures there will be a larger data base for evaluating and improving lake restoration planning and techniques.

The largest problems facing lakes today are caused or accelerated by human activities in their watersheds. These result in increased nutrients, sediment, and various pollutants, not to mention the old tires and beer cans that find their way into a lake. Nutrients, for example phosphorus and nitrogen, originate as agricultural and lawn fertilizers or are released from sewage, leaves, or other organic debris. They are car-



This fountain-like device is an aerator, which pumps lake water up into the air so that oxygen can mix with the water before it spills down a series of concrete steps and returns to the lake.

ried to a lake by storm water running directly off the land or through a storm sewer system. Excessive nutrient content may stimulate the growth of abundant aquatic weeds, algal blooms, or large, floating masses of algae. Sediments from plowed fields, construction sites, and dirty streets are carried into lakes by flowing water and settle out in the quiet lake waters. Eventually, accumulated sediment will begin to interfere with boating and swimming activities. Shallower water allows more light to reach the bottom and encourages rooted aquatic plant growth that will further restrict boating, fishing, and swimming. Abundant aquatic weeds and floating masses of algae also reduce aesthetic enjoyment of the lake.

Sediment and runoff waters contain the nutrients necessary for plant and algal growth. Nutrients are vital to a healthy, living lake which will support wildlife ranging from midge larvae to game fish and water birds. But an excess of nutrients often leads to too much productivity. This can result in large areas of rooted aquatic plants or algal blooms. The blooms, a sudden rapid increase in the number of algal plants in the lake, can cause taste and odor problems in drinking water, turn the lake pea-green, and foul fish harvesting equipment and water intake devices. When the algae die and decompose, they use dissolved oxygen that fish and other organisms depend on; fish kills may result.

Each summer large masses of algae formed in Medical Lake, Wash., and collected on the shorelines. The decaying "mats" of algae restricted swimming and boating and

robbed the lake of oxygen. During the summer of 1977, the Town of Medical Lake began a lake restoration program. Liquid aluminum sulfate (alum) was mixed into the lake at controlled depths, rates, and concentrations. Results from last summer's treatment indicate that the alum successfully reacted with the dissolved phosphorus in the lake and formed a "floc" or "clump" which then settled to the bottom. In addition to an increase in water clarity and a decrease in algae, field examinations show that the alum floc is trapping other sources of phosphorus which have previously encouraged algal growth. These promising results suggest that the restoration of Medical Lake should be a success.

Heavy metals such as mercury and lead are another lake pollution source. They are present wherever cars and factories are found. Special industries contribute other pollutants. For example, the Finger Lakes in Boone County, Mo., suffer from

acid mine drainage due to extensive strip mining in the area. The specific long-term effects of these pollutants on aquatic organisms, and ultimately on people, are largely unknown, but the general effects are not beneficial.

Each lake has unique problems and requires a tailor-made restoration plan. In 1974, a low water level and a high level of duck mortality around their lake prompted the Penn Lake Homeowner's Association to petition the Bloomington (Minnesota) City Council for help. A plan to restore the lake was adopted. It included drilling a well to provide supplemental water to the lake during periods of low rainfall, installing an aeration system to maintain a sufficient level of dissolved oxygen, excavating the lake to deepen it, and constructing several basins to catch sediment before it reached the lake. After it was well into the planning stage, the City became

aware of the funding available through EPA's Clean Lakes Program. An application was prepared and approved.

Last summer after the augmentation well and aeration system were operating, the lake was restocked with bluegill and bass. In contrast to other years, the fish have survived the winter and are expected to provide good recreational fishing. The incidence of algal blooms had decreased by last summer and they are not expected to regain their previous frequency or size. Elements of the project which have not been completed are the sediment basins, a proposed aeration system for upper Penn Lake, a three-year water quality monitoring program, a boat ramp and a parking lot. All but the last two will be completed with the help of clean lakes funds.

EPA's Region 5 office has the Great Lakes National Program, which deals with water quality problems in that area, and oversees U.S. implementation of the Great Lakes Water Quality Agreement with Canada. At present a two-year international study of the causes and effects of Lake Erie pollution is being carried out under the program.

EPA also has improved the quality of a number of lakes through some of its other programs. Wastewater treatment plants built with the help of the Agency's municipal construction program have provided primary and secondary treatment, which offer a way to keep human and industrial wastes out of recreational waters. Near the City of Seattle, upgraded wastewater treatment plants cut the nutrients entering Lake

EPA Clean Lakes Projects

California

Ellis
Gibralter
Lafayette (Reservoir)
Stafford
Temescal

Florida

Apopka
Jackson

Illinois

Frank Holten

Indiana

Skinner

Iowa

Blue
Lenox
Oelwein

Maine

Annabessacook
Little Pond

Maryland

Loch Raven (Reservoir)

Massachusetts

Charles River
Cochituate
Ellis Brett Pond
Lower Mystic
Morses Pond
Nutting

Michigan

Lansing
Reeds

Minnesota

Albert Lea/Fountain
Chain of Lakes
Clear
Hyland
Long
Penn
Phalen

Missouri

Finger
Rothwell
Vandalia

Montana

Mary Ronan

New York

Buckingham
Collins Park
Delaware Park
59th St. Pond
Hampton Manor
Hyde Park
Ronkonkoma
Steinmetz
Tivoli Lakes
Washington Park

North Carolina

Mystic

Oklahoma

Pauls Valley

Oregon

Commonwealth

South Dakota

Cochrane
Kampeska
Oakwood Lakes
Swan

Texas

McQueeney

Vermont

Bomoseen

Virginia

Rivanna

Washington

Ballinger
Liberty
Long
Medical
Moses
Sacajawea
Spada/Chaplain
Vancouver

Wisconsin

Half Moon
Henry
Little Muskego
Mirror & Shadow
Noquebay
White Clay

Washington, and thereby helped to preserve a boating and swimming facility used by many urban residents. (Seattle took the initial cleanup steps. EPA reimbursed them later for part of the cost and aided in further nutrient cleanup.)

Programs such as the Shagawa Lake Eutrophication Project in northern Minnesota have applied more advanced technology, in this case tertiary treatment, to stop the decline in the health of a lake. Phosphorus contributing to massive growths of algae was the problem in this lake. The treatment plant reduced the phosphorus level, and now the lake is no longer clogged with rotting masses of aquatic plants.*

Water quality management planning being carried out under Section 208 of the Clean Water Act has an impact on many sources that contribute to unhealthy lakes. These sources include urban runoff, acid mine drainage, sediments from erosion, and discharges by sewage plants and industries. Close coordination between the staff of the Clean Lakes Program and 208 planners helps to put the emphasis where it is needed most.

The Clean Lakes Program cooperates with the U.S. Army Corps of Engineers under the requirements of the dredge and fill program, as well. Any lake restoration program that meets Corps criteria is required under the terms of the EPA grant to apply for a dredging permit.

In the space of three years, the Clean Lakes Program has aided the restoration activities at 68 lakes (see following table). Increased emphasis on the program prompted the scheduling of a National Conference. Topics will include discussions of various lake problems, their causes, and the current status of techniques used to combat them. (see box) □

* See EPA Journal Vol. 2 #7 "Rescuing a Lake"

Lake Restoration Conference

EPA is sponsoring a national conference on lake restoration in Minneapolis, Minn., from August 22-24. The conference is designed for people who are interested in cleaning up lakes; officials of water pollution control agencies; State and local leaders, and teachers and researchers in related fields. Meetings will be held at the Sheraton-Ritz Hotel. Some 30 speakers are scheduled to talk about the practical application of restoration techniques. Successful State restoration programs in Minnesota, Florida, South Dakota, and Vermont, will be discussed. The conference will also feature field trips to two lake restoration projects near Minneapolis.



Land treatment is emerging as one of the popular alternatives to treating municipal waste water in a plant and then discharging it to the water. The rebirth of land treatment as an alternative technology that recycles nutrients while reclaiming waste water is an interesting phenomenon. History has a way of repeating itself, and the record shows that our national concept of wastewater management is no exception. We are seeing the rapid growth of a new conservation/reuse/recycling era.

Why is Land Treatment an Alternative?

The Federal record shows the changing land treatment story.

Richard Thomas is a physical scientist with EPA's Municipal Technology Branch.

The grants program to build treatment plants originated in the Federal Water Pollution Control Act of 1956. The Act didn't encourage recycling or land treatment. Its thrust was toward treatment in the municipal plants. But 16 years later, in the 1972 amendments to the Act, Congress gave EPA the first strong tools to encourage recycling, including the land approach. Then the Clean Water Act of 1977 strongly endorsed land treatment and provided financial incentives for its use. These new incentives should give EPA strength to implement its policy of encouraging widespread use of land treatment, a policy first issued in November, 1974, and again very strongly in October, 1977.

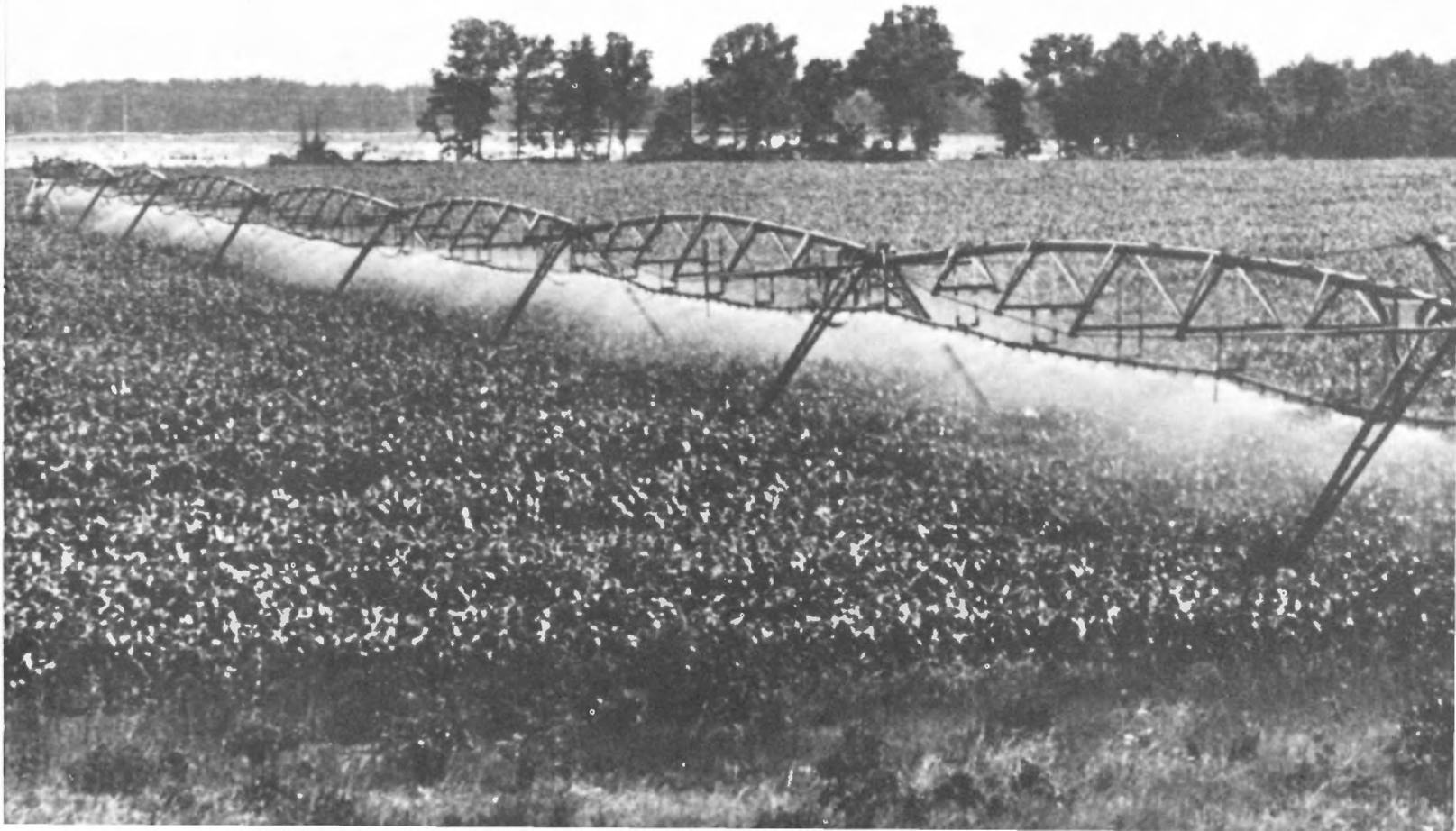
But while recycling is on the upswing, the common form of pollution control in the United States today consists of a system of sewers and treatment plants that discharge into

streams, lakes, or the oceans. Even the encouragement of land treatment in the 1972 Amendments was tempered by a Congressional push for secondary treatment in municipal plants by 1977. Cleansing of waste water at the treatment plant has always, until recently, been aimed at removing enough of the pollutants to allow natural processes in the receiving water to complete the process. This concept of waste water collection and disposal served us quite well until increasing amounts and changing composition of waste water discharges became a serious threat to the waterways. Damage such as fish kills alerted the Nation to the fact that we were degrading our rivers, lakes, and coastal waters.

Our plight was not new but rather a repeat of previous events. For example, the First Royal Commission on Sewage Disposal in England concluded that, "... The right way to dispose of town sewage is to apply it continuously on land and it is only by such application that the pollution of rivers can be avoided." This statement was published in the 1857 report of the Royal Commission. A similar conclusion was arrived at by George Rafter after a long and exhaustive study of sewage treatment in Europe and the United States. Mr. Rafter, like the Royal Commission, concluded that, "... The most efficient purification of sewage can be attained by its application on land," and "on properly managed sewage farms the utilization of sewage is not prejudicial to health."

Rafter conducted his studies in the 1890's and published the above conclusion in

Land Treatment By Richard Thomas



1899. Over the last 100 years, many other noted wastewater scientists have proclaimed the virtues of land treatment.

In essence, land treatment has been an available technology that has gotten little use or attention over the past 40 years in the United States. It is considered an alternative technology today because most municipalities have chosen in-plant treatment and stream discharges as the favored and hence conventional technology. Communities like Bakersfield, Calif., Lubbock, Tex., Calumet, Mich., and Lake George, N.Y., which have used land treatment for many decades, have found it very satisfactory. It has been economical and dependable and gives many of these communities an advantage in meeting the national goal to achieve wastewater management without polluting discharges.

Why is Land Treatment Attractive Now?

Our reawakening to the problem of polluting surface waters with sewage effluent has become a part of an overall awareness of a need to conserve resources and reduce energy demands. Land treatment is a wastewater management concept that embodies both of these needs.

Domestic and many industrial waste waters contain nitrogen and phosphorus, which are essential for plant growth. Removal of this nitrogen and phosphorus by in-plant treatment requires chemicals and energy and drives the cost of wastewater treatment upward. Land treatment uses the nitrogen and phosphorus for plant growth or relies on natural processes to remove the nitrogen and phosphorus from the waters.

It takes about 10 times as much energy for a sewage treatment plant to produce the same quality of reclaimed water as land treatment. In addition, the land treatment alternative is reusing valuable nutrients for production of cash crops. For example, reuse of nitrogen, phosphorus, and potassium at Muskegon, Mich., in 1975 amounted to \$110,000 of fertilizer value. This contributed to a total crop income of

\$710,000, which offset one third of the costs of operating the whole wastewater treatment system. These operating results fuel EPA's thrust to make land treatment a recycling alternative of choice. The EPA policy on land treatment calls for preferential consideration of this approach because it contributes to reclamation and recycling.

It has been estimated that the domestic sewage discharged to our surface streams on a national scale contains 800,000 tons of nitrogen, 700,000 tons of phosphorus, and 470,000 tons of potassium per year. This is about 10 to 15 percent of the national fertilizer consumption of these valuable nutrients. While our agricultural producers pay approximately \$500 million annually to buy this amount of fertilizer, the sewage discharges continue to pollute our surface waters rather than fertilize crops. Why is it that such an economically attractive way of recycling resources has not been accepted more readily? There are constraints that have held back institutional and public acceptance. Some are real, others are mostly conjecture and fear of the unknown.

What are These Constraints?

Underlying all of the reasons usually given for not using land treatment is the repugnance that Americans feel toward their own wastes. We have disassociated ourselves from thinking about the problem. In doing this we have become comfortable with the treatment and discharge concept of waste disposal. We have been confident that water treatment plants will make our drinking water "safe" and we will not be subjected to the epidemics of the 19th century. Those who vigorously oppose land treatment often cite this fear of health risk in their arguments that land treatment is not as good as conventional in-plant treatment and water disposal.

The technical reliability of land treatment is usually a secondary factor in decisions to adopt sewage plant treatment. The reasons for rejection of

land treatment are availability of land, unsubstantiated high costs, general institutional resistance, and the fear of health risks.

It is rare to find someone who favors having a waste management facility as a neighbor. Most people want it to be someone else's neighbor. But progress is being made and a local resident who spoke strongly for land treatment as a "preferred neighbor" was a pivotal influence in a recent decision to adopt land treatment instead of in-plant advanced treatment for a large system that will improve the dependability of a drinking water supply. It is interesting and at the same time perplexing to observe public reaction across the Nation. In watershed areas people use golf courses, parks, and recreational lakes maintained with waste waters reclaimed by land treatment. In other parts of the Nation the fear of the unknown and the repulsion toward wastes form an almost impenetrable barrier.

EPA has responded to this general repulsion and fear of the unknown with an effort to develop information on land treatment and present these facts to the public and to decisionmakers. The 1977 Act increases EPA's capability to educate by establishing a public information program on land treatment and other recycling and reuse methods.

Projections for the Future

The effort to establish land treatment as an accepted recycling and reclamation alternative is founded on a strong technical base. It gives careful consideration to protection of the groundwater and the land resources as well as the surface waters. The environmental emphasis of the 60's and 70's has broadened our concern for management based on the total content of the waste water. It is no longer enough to build treatment plants that remove part of the suspended solids and oxygen-demanding substances. EPA now considers nutrients, metals, and trace organics as pollutants to be removed or, more appropriately, recovered or recycled.

Land treatment offers many options for recycling nutrients while reclaiming waste water. The natural processes in the plant/soil environment also provide a strong force for removal of toxics and the return of many trace constituents to the soil and geological formations. Some of the options available are represented in Phoenix, Ariz., Bakersfield, Calif., Lake George, N.Y., and Clayton County, Ga. The Phoenix plan—called the Rio Salado Project—represents a three-time use of the same water to extend a limited supply. Land treatment by the rapid-infiltration process is followed by the recreational and irrigation use of the reclaimed waste water. (Rapid-infiltration cleans waste water by fast percolation through the soil.) The Bakersfield project is an example of continuing use of municipal waste water to irrigate cash crops. The rapid-infiltration system at Lake George is a good example of a 40-year-old treatment system which may be achieving the no-discharge goal of the Federal law on water pollution. It is interesting to note that groups wanting to protect Lake George in New York and Lake Geneva in Wisconsin both enacted ordinances requiring land treatment some 40 years before Federal law encouraged it. The Clayton County project, to use a comparatively large treatment system, represents a major breakthrough for land treatment. The system will irrigate a forest with effluent in the watershed of a reservoir. A significant objective of the project is to conserve water and improve the dependability of the water supply in the reservoir.

Like the Royal Commission in England in the 1850's and George Rafter in the United States at the turn of the century, I am convinced that land treatment will become a conventional way to manage wastewater. Those early advocates were unable to foresee the future completely, though, and only time will tell us if land treatment is finally to become a norm. □

News Briefs

EPA Expresses Concern About Gas Prices

Decontrolling the price of gasoline could hurt the Nation's efforts for clean air, an EPA official recently said in Congressional testimony. It could encourage the price difference between unleaded and leaded gasoline to be even bigger than it is today, said Benjamin Jackson, Acting Deputy Assistant Administrator for Mobile Source and Noise Enforcement. Recent figures showed unleaded regular gas was an average of 4.1 cents higher than leaded regular at full-service stations. A bigger price gap could be an incentive for motorists to use leaded gasoline in cars requiring unleaded, said Jackson. Unleaded gasoline has been required in most automobiles built since the 1975 model year to protect the cars' catalytic converters.

Two Groups Honor Blum

Deputy Administrator Barbara Blum was honored recently by the Americans for Indian Opportunity (AIO) and Federally Employed Women (FEW). AIO, which has worked since 1970 to provide improved expertise and resources to native Americans, cited Blum's long personal interest in Indian affairs and her establishment of an EPA "Indian Working Group" to consider the effects of EPA regulations on tribal lands and reservations. FEW, an organization dedicated to equality for women in government, praised Blum's work recruiting women and minorities for key positions at EPA and her contributions to advancing women's careers throughout government.

Walsh Named To EPA Post

Michael P. Walsh has been appointed as the Agency's new Deputy Assistant Administrator for Mobile Source Air Pollution Control. Walsh said his office will provide special attention to States requiring regular inspection and maintenance programs to reduce emissions from automobiles. A former special assistant to David Hawkins, Assistant Administrator for Air and Waste Management, Walsh has been with EPA since July, 1974. Prior to joining EPA he was Director of New York City's Bureau of Motor Vehicle Pollution Control. Walsh replaces Eric Stork, who is now at Purdue University.

People

Administrator Costle presented an EPA plaque to Humberto Romero Alvarez, (left) Mexico's Undersecretary for Environmental Improvement, during a visit last month to Mexico City when they signed an agreement pledging mutual cooperation on environmental problems.



Steve Jellinek

The EPA Assistant Administrator for Toxic Substances, spent 3 days in Missouri in late May meeting with farmers, environmentalists, industry representatives, and others. Purpose of the trip—and similar ones Jellinek plans to make to other States in the coming months—was to informally exchange ideas and

views on the Agency's pesticide and toxic substances programs, for which he is responsible. The Missouri trip included a visit to the 1,600-acre farm of John Riedel near Centralia.



Lance Vinson

Region 8 Administrator Alan R. Merson has named Vinson as Director of the Enforcement Division in the Denver office. Vinson, who has been acting director for several months, was Chief of the Region 8 Enforcement and Legal Support Branch for the past two years. He previously served as Chief

of the Case Development Section, Air Enforcement Branch in EPA's Region 5 office in Chicago. Vinson is an attorney, a graduate of Loyola Law School, and a member of the Bar Associations in California, Illinois, and Colorado.

Chris L. West

He has been named Public Awareness Director for the Agency's Environmental Research Center at Research Triangle Park, N.C. At his new post, West will handle public information and community relations for the four laboratories that make up the research complex. West had been Public Awareness Director for EPA's

Richard T. Dewling

He has been named Deputy Regional Administrator for EPA's New York office by Regional Administrator Eckardt C. Beck. Dewling was most recently Director of the Surveillance and Analysis Division at the Region 2 laboratory in Edison, N.J. He has a bachelor's degree in sanitary engi-



neering from Manhattan College, a master's degree from New York University, and a doctorate in environmental sciences from Rutgers University. Dewling is 42 and a native of New York City. "I am delighted to have a professional with Dick Dewling's solid grounding in environmental sciences and strong experience

in managing EPA programs to help us deal with the many problems facing us in Region 2," said Beck.

Mrs. Mary Stinson and Dr. Herbert S. Skovronek

These two researchers at EPA's Edison, N.J., laboratory have received an award for the Best Paper of 1977 appearing in the American Electroplaters' Society Journal, *Plating and Surface Finishing*. The paper, "Advanced Treatment Approaches for Metal Finishing Waste-



waters," discussed new ways to control cyanide and metal discharges. Stinson and Skovronek received a gold medal, a plaque, and an honorarium as part of the award. Both work in a field station of EPA's Industrial Environmental Research Laboratory, part of the Office of Research and Development.

Don R. Goodwin

The director of EPA's Emission Standards and Engineering Division at Research Triangle Park, N.C., he has been given the S. Smith Griswold Award by the Air Pollution Control Association. The award is presented to a government staff person for outstanding accomplishment in prevention and

control of air pollution. Goodwin was recognized for his major role in developing two national air pollution control programs: the new source performance standards and national standards for hazardous air pollutants. He is a graduate of the University of Pittsburgh in chemical engineering and served with the National Air

Pollution Control Administration, an EPA predecessor agency, from 1964-1970.

Corvallis Environmental Research Laboratory since 1972. His previous government experience included serving as Public Information Officer for the U.S. Atomic Energy Commission at Oak Ridge, Tenn., and Las Vegas, Nev. He received a bachelor's degree in journalism from the University of Missouri in 1964.

**Paul De Falco, Jr.**

The Regional Administrator of EPA's Region 9 San Francisco office is the first non-resident of Guam to be named an honorary member of the Ancient Order of the Chammorei, the original people of Guam. Governor Bordallo and the Legislature of Guam gave De Falco the award

for the pollution control assistance he has provided for the people of Guam over the past 10 years.

Deserts on the March

By Allen Cywin

More than one third of the Earth's land area is arid. Much of it has become desert since the dawn of civilization and many vulnerable areas are even now being turned into desert. In the past half century, on the southern edge of the Sahara alone, as much as 650,000 square kilometers of once productive land have become desert.

Much of the western United States is arid or semi-arid. Deserts of all types are found within our geographic boundaries. Drought represents a recurrent menace for us and many other parts of the world. In connection with this problem, the President has announced a new water resources policy, with "conservation as its cornerstone."

Several years ago, the Sahelian drought in Africa and its tragic effects on the peoples of that region drew world attention to the chronic problems of human survival and development on the desert margins.

From 1968 to 1973 drought swept along a 2,600-mile-long band through the six nations of the Sahel—Senegal, Mauritania, Upper Volta, Mali, Niger, and Chad, leaving behind devastation and death. More than 25 million people were exposed to starvation and disease. Observers echoed an old saying that the Sahara was "on the march." Sahel is an Arab word meaning "shore." It describes a wide stretch of land extending along the southern edge of the Sahara.

Desertification—the spread of the desert into semi-arid and

marginal lands—is neither new nor confined to Africa. It is going on in the Middle East, in parts of Argentina, Brazil, Chile, Peru, Mexico, China, India, and the United States. It is caused by many factors including climate changes, overgrazing and overcropping of land, denudation of trees by timbering and firewood gatherers, and subsequent erosion of precious topsoil.

To give impetus to international action, the U.N. General Assembly in December, 1974, decided to convene a United Nations Conference on Desertification August 29 to September 9, 1977, in order to produce an effective, comprehensive, and coordinated "Plan of Action to Combat Desertification."

The United Nations Environmental Program (UNEP), headquartered in Nairobi, was given the responsibility for organizing that conference. UNEP employed a number of consultants from within and outside the U.N. to draft a plan of action as well as to prepare for the conference.

The U.S. Department of State, in turn, organized an interagency task force, with additional outside participants. William Long of the U.S. Department of State was the chairman of this task force and coordinator for developing a U.S. position.

The Federal Water Pollution Control Administration, a predecessor of EPA, had helped sponsor a conference on "Arid Lands in Transition" in 1969, and a number of present EPA research projects also are related to controlling the degradation of air, land, and water in these regions. EPA's western

regional offices and our relationships on environmental matters with Mexico provided additional background.

The first plan of action, developed by UNEP consultants, appeared to be nothing more than a series of physical steps toward "desert development" projects, rather than recognizing the social, cultural, economic, and even energy constraints and problems of combatting the ravages of desertification.

The United States reacted critically to the original as well as subsequent drafts of the plan of action. As a result, many U.S. suggestions were offered and accepted. The final product therefore represents a more balanced recognition of environmental hazards of short-term development solutions and focuses on the human problems in these regions.

One of the reasons for hope in preventing this further spread of deserts around the globe is the countermeasures that several nations already have successfully taken. In the aftermath of the Dust Bowl tragedy in the Great Plains during the 1930's, the United States responded with improved land husbandry, the planting of thousands of windbreaks to halt wind erosion, and many other measures that have made once-desolate land productive. In Israel's Negev Desert, historically subject to overgrazing and deforestation, the land is now blooming and prosperous as a result of controlled grazing, improved dryland farming, and new irrigation practices.

Similarly, Algeria has begun a vast tree-planting project expected to total some 20 billion seedlings to deflect winds and halt the movement of sand

dunes. Mexico, Pakistan, and India also are conducting large reforestation programs.

There is a line in Ibsen's play, "The Wild Duck," where one character says, "The trees have their revenge." That may well be the epitaph for the once-verdant Sahara and other similar regions unless deforestation, overgrazing, and other abuses of the land are halted and reforestation and improved land use widely sponsored.

One of the first acts of the U.N. conference last year was to redefine the word "desertification" itself. The new version actually reads more like a case history of the process, and includes this description:

"Desertification is the diminution or destruction of the biological potential of the land, and can lead ultimately to desert-like conditions. It is an aspect of the widespread deterioration of ecosystems, and has diminished or destroyed the biological potential, i.e. plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development . . .

"In exceptionally fragile ecosystems, such as those on the desert margins, the loss of biological productivity through the degradation of plant, animal, soil, and water resources can easily become irreversible, and permanently reduce the capacity to support human life. Desertification is a self-accelerating process, feeding on

Allen Cywin is Senior Science Advisor in EPA's Office of Water and Hazardous Materials.



itself, and as it advances, rehabilitation costs rise exponentially. Action to combat desertification is required urgently before the costs of rehabilitation rise beyond practical possibility or before the opportunity to act is lost forever."

As a part of the preparation for the worldwide meeting, UNEP held four regional meetings. A second draft of the "Plan of Action" provided the vehicle for discussion at those meetings.

The United States expressed skepticism about this proposal, declaring that a vast amount of technical information and knowledge was already available on which to plan sound future action and that in many areas adequate institutional arrangements probably existed to carry out remedial programs.

We further summarized our comment as follows: (1) The second draft of the Plan of Action, despite its improvements over draft one, still appeared to be a shopping list of possibilities rather than a definitive and specific plan that would lead to "on the ground" activities. (2) There was sufficient information available on which to base program projects, and activities to combat desertification. The need for research activities should be based on requirements for implementing action programs. (3) Ecologically sound land use and management needed additional emphasis. (4) The real problems of desertification are a function of man's use and misuse of the land. (5) Demographic considerations should



Herds of grazing animals like these goats in a Nigerian village contribute to the increasing problem of growing deserts by nibbling the ground cover.

be more fully developed (6) There were a variety of existing national and/or international organizations/bodies whose functions should be evaluated before deciding that new institutions must be established

The Environmental Protection Agency representation led the U.S. delegation at the "Mediterranean Area" (Europe, North Africa, and the Middle East) meeting. Other meetings were held on "The Americas," "Africa, South of the Sahara," and "Asia and the Pacific." Through these efforts, much of the U.S. position was agreed to and recommended to the general meeting.

A final Plan of Action was discussed and adopted at the international meeting in September of 1977. Over 95 countries and many international agencies attended.

The report has now been formally submitted to the United Nations General Assembly and to individual nations for implementation.

The basic principles adopted include the following points:

- Immediate application of existing knowledge is needed in measures against desertifica-

tion and in educating endangered communities about the problem. Training programs should be begun through international organizations.

- Improved land use with sound management based on known ecological principles is a key to combatting desertification.

- This land use should recognize the inevitability of periodic drought in dry lands and their generally low natural biological potential.

- Rescue programs should restore vegetation cover on marginal land, making use of adapted species of plants and animals.

- Alternative supplies of food and fuel should be provided where the restoration of vegetation requires a ban on over-cutting, over-grazing, and similar activities.

- U.N. resources should be pooled for an integrated worldwide program of research, development, and application on desertification.

- While short-term relief for desertification is necessary, long-term measures should not be delayed, since prevention costs less than cure.

In summary, I believe the U.N. approach has vastly changed into a better appreciation of problems, including the social and nonstructural solutions to them. This evolution was fostered by the United States, but could only have been achieved through mutual understanding and cooperation of the many other nations that participated.

An encouraging outgrowth of the U.N. conference already is a separate conference on mutual desertification problems by Mexico and the United States, which is now being planned. The Bureau of Oceans and International Environmental and Scientific Affairs of the U.S. Department of State is the lead agency in an interagency working group for this conference, which probably will be held in Mexico City later this year.

Mexican environmental officials, who proposed the idea, said they had been impressed by the cooperation between the United States and Canada on shared water resources and felt that a similar exchange of information on problems involving arid lands that extend continuously from the Southwest into Mexico would be useful. Among topics to be explored will be improved management of range land, the concept of grazing fees, planting of windbreaks, ground water protection, environmental monitoring, and prevention of deforestation and denuding of the land. □

Update

A listing of recent Agency publications and other items of use to people interested in the environment.

Federal Register Notices

Copies of Federal Register notices are available at a cost of 20 cents per page. Write Office of the Federal Register, National Archives and Records Service, Washington, D.C. 20408.

Water Pollution

EPA amends rule under the Clean Water Act to control the discharge of hazardous substances; effective 6/5/78. Pp. 24309-310, in the June 5 issue.

Polychlorinated Biphenyls (PCB's)

EPA proposes to prohibit manufacturing, processing, distribution, and use; comments by 8/7/78, Pp. 24802-817, June 7 issue.

PCB's and Fully Halogenated Chlorofluoroalkanes

EPA provides preliminary guidance for exporters; effective 6/8/78, Pp. 24818, June 7 issue.

Regulations Under Consideration

The following rules are being developed by EPA. The Agency encourages public comment. EPA contacts and proposed issuing dates are listed so that interested persons can make their views known. These rules will be issued in September:

Under the Clean Air Act, a regulation to require use of the best demonstrated control technology for emissions from stationary internal combustion engines and a regulation to control particles produced by quarrying of nonmetallic minerals and related operations. Regulations are also being considered to declare as hazardous pollutants arsenic emissions (primarily from copper smelters), benzene emissions, and coke oven emission-charging and topside leaks. To comment on these rules write or phone Don Goodwin (MD-13), EPA, Research Triangle Park, N.C. 27711. (919) 541-5271.

Under the Clean Water Act, effluent guidelines for industries are being reviewed to ensure that the best available technology requirements, new source performance standards, and pretreatment guidelines are current. For timber products

processing write or phone John Riley (WH-552), EPA, Washington, D.C. 20460. (202) 426-2554. For steam electric powerplants write or phone John Lum (WH-552), EPA, Washington, D.C. 20460. (202) 426-4617. For leather tanning and finishing write or phone William Sonnett (WH-552), EPA, Washington, D.C. 20460. (202) 426-2707.

Under the Atomic Energy Act, a regulation to set environmental standards for high-level radioactive waste. Write or phone Richard Guimond (AW-460), EPA, Washington, D.C. 20460. (703) 557-8927.

Under the Resource Conservation and Recovery Act, guidelines to help Federal agencies ensure that procured materials are composed of recycled materials as much as possible. Write or phone Stephen Lingle (WH-563), EPA, Washington, D.C. 20460. (202) 755-9140. A regulation that would require industry to keep records of health reactions to its chemical products and consumer complaints about its chemical products. Write or phone Ed Brooks (TS-788), EPA, Washington, D.C. 20460. (202) 426-9819.

Conferences

National Conference On Lake Restoration, Sheraton-Ritz Hotel, Minneapolis, Minn. Aug. 22-24.

More information on the following conference is available from Susan Armstrong, Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201. (614) 424-7769.

States Served by EPA Regions

Region 1 (Boston)
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
617-223-7210

Region 2 (New York City)
New Jersey, New York, Puerto Rico, Virgin Islands
212-264-2525

Region 3 (Philadelphia)
Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia
215-597-9814

Region 4 (Atlanta)
Alabama, Georgia, Florida, Mississippi, North Carolina, South Carolina, Tennessee, Kentucky
404-881-4727

Region 5 (Chicago)
Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota
312-353-2000

Region 6 (Dallas)
Arkansas, Louisiana, Oklahoma, Texas, New Mexico
214-767-2600

Region 7 (Kansas City)
Iowa, Kansas, Missouri, Nebraska
816-374-5493

Region 8 (Denver)
Colorado, Utah, Wyoming, Montana, North Dakota, South Dakota
303-837-3895

Region 9 (San Francisco)
Arizona, California, Nevada, Hawaii
415-556-2320

Region 10 (Seattle)
Alaska, Idaho, Oregon, Washington
206-442-1220

Around the Nation



Bottle Bill Passes

Connecticut Governor Ella Grasso has signed a bottle bill requiring deposits on soda and beer containers, and banning cans with detachable flip tops. The law, which will take effect in January, 1980, had been debated in Connecticut for six years. Similar laws exist in Maine, Vermont, Oregon, and Michigan.

Coastal Zone Program Approved

Massachusetts has become the first East Coast State to win approval of its Coastal Zone Management Program from the U.S. Department of Commerce. The program will increase protection for sensitive coastal areas such as salt marshes, barren beaches, dunes, and shellfish beds through more vigorous enforcement of existing environmental laws. Improvement of the State's fishing industry and planning for onshore impacts of oil and gas exploration are also part of the plan. Massachusetts is eligible for \$1.2 million in Federal funds for coastal zone management.



Gas Fraud Charged

The Region 2 Enforcement Division has cited a retail gasoline station on Long Island for deliberately defrauding customers. EPA charges that the Merrick, N.Y., service station switched the face plates of two gasoline pumps so

that less expensive regular fuel containing lead, was sold as higher priced super premium fuel, which is supposed to be unleaded. In addition to defrauding customers, this practice can ruin the catalytic converter and other parts of cars that require unleaded gas. The Agency has recommended a \$5,900 civil penalty against the service station. Amoco Oil Co., the station's supplier, discovered the discrepancy during regular quality control sampling. Amoco notified the Nassau County Bureau of Weights and Measures, which performed inspections that confirmed the supplier's suspicions. The County then notified EPA. Agency surveys in various parts of the country suggest that 10 percent of all vehicles designed to use unleaded fuel received the leaded product instead, which poses a threat to the success of the auto emission reduction program by impairing the functioning of pollution control equipment.



EPA Sues Philadelphia

Region 3 recently filed suit through the U.S. Justice Department against the City of Philadelphia for violation of the Clean Water Act and the Marine Protection, Research and Sanctuaries Act. Jack J. Schramm, Regional Administrator, said that delays in building and improving three sewage treatment plants and slow development of land-based alternatives to ocean dumping have had a detrimental effect on the health and economy of Philadelphia, and have left the Federal Government with no choice but to

go to court. "The city was first ordered to upgrade its level of treatment in 1968 and because of a lack of progress during the past 10 years now contributes about half the pollution load from all municipal and industrial sources combined along the Delaware Estuary," said Schramm. He added that sewage plant construction will create up to 1,800 jobs in the Philadelphia area but that Federal funding for the projects hinges on actions by the city. One suit asks the Court to enjoin the city from any further delays in sewage treatment plant construction and to fine the city if it does not follow a court-imposed construction schedule. A related action asks penalties for past violations of Philadelphia's sewage discharge permits. The second suit asks collection of \$225,000 in civil penalties recently assessed by Schramm for the city's 32 violations of its 1976-77 ocean dumping permit and asks the Court to enjoin Philadelphia from violating its present permit.

Fuel Agreement Reached

Region 3, the States of Pennsylvania and New Jersey, and the City of Philadelphia have agreed to a proposal that will adjust limits on the sulfur content of fuel used in the Philadelphia area, to share the task of meeting air quality standards. Under the new proposal Philadelphia facilities that use heavy fuel oil can burn .5 percent sulfur oil instead of the .3 percent now required by the EPA-approved Pennsylvania State Implementation Plan. Fuel sulfur levels in areas immediately adjacent to the city can be reduced from 1.0 percent to .5 percent. Outlying facilities will be required to burn 1.0 percent sulfur

oil. New Jersey facilities in counties adjacent to Philadelphia can raise their sulfur level from .3 to .5 percent, while facilities in outlying areas will be reduced from 2.0 to 1.0 percent. Region 3 administrator Jack J. Schramm said "If the proposal is put into effect, the result will be to take away much of the financial inequity placed on facilities in Philadelphia and portions of New Jersey without sacrificing the quality of the air." He noted that the agreement is a breakthrough in negotiations that EPA has mediated for the past two years.



Spill Fines Levied

Region 4 has collected more than \$400,000 in penalties from firms in the Southeast that have spilled petroleum products or have failed to plan properly for the containment of such spills. EPA has jurisdiction over spills of oil and other materials on inland water bodies under the 1972 Amendments to the Federal Water Pollution Control Act. While the majority of the fines were for spills of oil products, more than \$137,000 was collected from firms that failed to develop and implement Spill Prevention Control and Countermeasure Plans. These plans are required for facilities storing certain volumes of petroleum. When a spill occurs the firm responsible must pay the full cost of cleanup in addition to the penalty.

Louisville Plant Operational

The Morris Forman Wastewater Treatment Plant in Louisville, Ky. is operating again after

being shut down because of chemical contamination. In early summer the plant was not meeting permit limitations for discharge into the Ohio River. In early 1977, the facility and some of Louisville's principal sewers were contaminated with thousands of gallons of highly toxic chemicals allegedly dumped into a downtown manhole. The plant, which has a capacity of 105 million gallons per day, serves Louisville and portions of Jefferson County. The Metropolitan Sewer District put the plant back into operation late in May to comply with an EPA administrative order issued in April. The agency also filed a lawsuit against the utility for failure to meet limits in its discharge permit.



Lake Study Released

While gross pollution has been subsiding, Lake Michigan has shown increasing evidence of subtle enrichment over the last 10-15 years, according to a recent EPA study. The results of the study were released during the three-day Lake Michigan Fair cosponsored by Region 5 and the Lake Michigan Federation in early June. The study says that the coastal areas of the lake are showing adverse effects of the increase of nutrients in the lake. Researchers found that many shore areas and bays are mesotrophic, which means the water contains a moderate amount of dissolved nutrients, or are eutrophic, meaning the water is rich in dissolved nutrients and is often short of oxygen. The open waters of the lake, especially in the central and northern areas, are in

transition from the oligotrophic state, that is, well-supplied with oxygen and short of nutrients, to mesotrophic. The southern basin is more mesotrophic. The study will be published in October. Meanwhile a 20-page summary is available in limited quantities from the Office of Public Affairs, Region 5. (See address on P. 33.)



Rural Drinking Water Study

Region 6 began its part of a national drinking water study in early June. The research project examines both the quality and the quantity of water available to residents of rural America. The study includes interviews with individuals and analyses of household tapwater samples. Initial interviews are being conducted in two counties apiece in Arkansas and Oklahoma. Later parts of the study will include surveys in other counties of those two States as well as in Louisiana, Texas, and New Mexico, and will conclude in mid-October. Four hundred counties nationwide will be covered in the study, which is required under the Safe Drinking Water Act because complete information on rural water conditions is not available now. Results of the study will be used to assess the types and locations of rural water problems.

Clean Water Act Meetings

"Implementing the Clean Water Act of 1977", one of five nationwide seminars, was held in Dallas June 12. The day-long meeting covered Agency plans for implementing new provisions of the Act

and gave special emphasis to proposed regulations for Agency grants for construction of municipal wastewater treatment facilities. Another meeting was held June 28 to obtain public comment and testimony about new regulations under the Act.



Indian Meeting Held

Region 7 recently held a meeting with people from five of the eight Indian tribes that have reservations within the Region. Tribal leaders were among those attending the one-day session, along with representatives from the Bureau of Indian Affairs and the Indian Health Service. Joining in the meeting were representatives from the Americans for Indian Opportunity, a non-profit organization that has been working with a grant from EPA to advise tribes across the Nation about their responsibilities and options under the Federal Insecticide, Fungicide, and Rodenticide Act. Dr. Kay Camin, Regional Administrator, told the participants that the purpose of the meeting was for EPA to learn about the environmental needs of the Indian people and for the tribes to learn about the environmental services and concerns of EPA. The agenda featured areas of major concern—drinking water, sewage treatment, solid waste, pesticides—presented by EPA's program staff, with an emphasis on discussion. A session on jurisdictional problems was led by Leigh Price of the EPA's pesticide program. The meeting ended with a commitment by all participants to maintain an open and active working relationship.



Airport Expansion Debated

Region 8 Administrator Alan Merson has asked the Federal Aviation Administration to submit to EPA environmental assessment documents that relate to a Frontier Airlines proposal to initiate scheduled jet service to Jackson Hole Airport in Grand Teton National Park. According to Merson the action is subject to review under the National Environmental Policy Act as well as Federal Aviation Administration regulations, the Department of Transportation Act, the Historic Preservation Act, and the Clean Air Act. Merson is concerned about the consequences of the Frontier Airlines proposal because of its relation to the Jackson Hole Airport Master Plan. EPA is presently reviewing the draft environmental impact statement for that master plan. The conclusion of EPA's review of the impact statement is expected to be that airport expansion, which would mean more air traffic and the expansion of jet service to the area, is environmentally unacceptable and economically unnecessary. The Frontier Airlines proposal would bring modified Boeing 737 jets into service over the park starting this summer. The Jackson Hole Airport is the only airport located within a national park. Merson cited "the sensitivity of park and wilderness area users to the impacts of aircraft noise" as a major concern in questioning the approval of jet service and airport expansion.



Clean Air Act Determination

Administrator Douglas M. Costle recently determined that the 1977 Clean Air Act applies to oil operations on the Outer Continental Shelf, the plain extending below the ocean along the coastlines. At issue was Exxon Corporation's proposed oil storage and treatment facility, which would be anchored near platform Hondo, 3.2 miles off the coast of Santa Barbara, Cal. The facility is a converted tanker with equipment to separate oil and gas, and to compress and dehydrate gas. Authority for the determination comes from the Outer Continental Shelf Lands Act, which "extends" U.S. laws to apply to all fixed structures located in that area. The decision is EPA's first application of the new act and sets the tone for future decisions about offshore activities. It applies the new source review and prevention of significant deterioration provisions of the Clean Air Act to any facility in the Outer Continental Shelf whose emissions might affect a State's plans to achieve ambient air quality standards. Exxon Corporation is challenging EPA's determination in the courts.



Environmental Quality Awards

Region 10 recently announced the 12 recipients of the annual environmental quality awards given in this region. Each win-

ner was chosen, according to Regional Administrator Donald P. Dubois, because of efforts that have brought environmental improvements or have contributed to promoting better understanding of environmental issues. The winners include: public officials James M. Spangler, Fort Steilacoom, Wash., for pioneering use of wood pellets as fuel with resulting reductions of air pollution, and Arthur R. Dammkoehler, Seattle, Wash., for work with the Puget Sound Air Pollution Control Agency.

Citizen activists: Holway Jones, Eugene, Ore., for establishing the Oregon Wilderness Coalition, and Robert Lynette, Redmond, Wash., for alerting Northwesterners to the dangers of locating oil transshipment facilities on Puget Sound. Environmental educators: Peter F. Jensch, Gresham, Ore., co-author of *Investigating Our Ecosystem*, an environmental textbook, Helene Schuller, Seattle, Wash., for involving students in pollution cleanup, and the Youth Conservation Corps, Alaska, for summer camp projects throughout that State.

Journalists: Kathy Johnston, Hayden Lake, Ida., for a series of articles on pollution in northern Idaho lakes, Jim Kadera, Portland, Ore., for in-depth articles on environmental issues, and Steve Green, Seattle, Wash., for articles linking the impact of oil development to air pollution problems.

Public agencies: the Council of Governments, Lane County, Ore., for successful development of their water quality management plan, and the Transit Department, Municipality of Metropolitan Seattle, Wash. for construction of two park-ride lots and planning of other measures to relieve traffic congestion.

Senate Leaders

Muskie

Continued from page 4

lack of interest in the success of the program. In these instances, the Agency should continue its enforcement policy of seeking court-imposed penalties for non-compliance in amounts related to the benefits of delayed compliance.

Third, the industrial pretreatment program established in the 1972 Act has been made more workable. This program has been designed to protect our municipal treatment plants from non-compatible industrial discharges and to keep our municipal sludge free of harmful toxic pollutants.

Congress applauds the success to date of a majority of our Nation's major industries for achieving the requirements of the 1972 Clean Water law. Through the enactment of the 1977 Amendments, we have acted fairly toward those who made an effort to comply, and we have realistically adjusted certain industrial regulations accordingly.

The 1977 Act also addressed several other important provisions:

- The Environmental Protection Agency, through Section 404, is mandated to develop an effective program for controlling the pollution of the Nation's 76 million acres of wetlands. The Agency is also required to monitor the protection of these water areas in coordination with other Federal agencies and the States through a permit program. Federal jurisdiction over the wetlands has been retained, and I am hopeful this means the fragile wetlands environment will truly be protected.
- Federal authority to clean up oil and hazardous substance pollution has been extended to 200 miles from the shoreline. The liability limits on tankers and facilities for spill clean-up have been raised. These amendments provide interim assurance that adequate authority exists to clean up most spills of oil and hazardous substances until separate legislation to create a "superfund" through a fee on oil transportation can be enacted.
- Federal facilities now must comply with both procedural and substantive provisions of the clean water law.

The 1977 Clean Water Act continues the national goal of eliminating the discharge of pollutants into our water. It was not easy legislation to enact. The amendments to the Act took two years of hard work by Congress to develop.

But we have reached an important turning point in our struggle for clean water. Our emphasis must now shift from legislation to the implementation of regulations. We have a law capable of achieving our goals. We now must work toward regulations to match.

Six and a half years ago, I made the following remarks which I think are as relevant today as then in describing the nature of our environmental challenge:

"It is imperative that we attempt to stop pollution and to restore the quality of our environment. I suggest that we begin by adding to our approach some humble ideas about ourselves and our place upon the planet.

"It may be, as some argue, that man is the most adaptable of Earth's creatures. It may be that he can remain essentially the same, changing only slightly as he adjusts to higher levels of pollution.

"But what we do not know, and what we cannot predict accurately, are the long-range effects upon man of prolonged exposure to bigger and bigger doses of pollution. Man, no less than the peregrine falcon and the mountain lion, is an endangered species.

"He is also the principal danger to himself, the principal polluter of his environment. Foul air, dirty water, ravaged land, are more than complex problems in resource management. What must be managed, and properly managed for our own protection, are our activities within our environment.

"There is another humble idea that should be added to our approach: We live today in what an engineer might call a closed system. Some of our resources, once used, cannot be replaced. Others of our resources are renewable, but finite. No one is likely to invent more clean water, more clean air, more arable land." □



Senate Leaders

Stafford

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billion for FY 1980 in addition to the \$4.5 billion contained in his FY 1979 budget request.

Let me add a word of caution here. The availability of these additional funds should not lull State water quality administrators or local officials into believing that money will always be available, whatever the need. The previous Administration set out a strategy which suggested support for a 10-year, \$45 billion Federal assistance program. The present Administration is proceeding consistently with that plan.

Yet the 1976 Needs Survey estimated the grant eligible costs of publicly-owned treatment works and associated sewers (categories I-V) at \$95 billion, of which \$71.8 billion represents the Federal share. Of that, \$62.0 billion must come out of the newly authorized funds and future authorizations. Because Congress did not place certain anticipated restrictions on the funding of sewers or the reserve capacity of treatment works, the "needs" have not been reduced to approximate the \$45 billion level of Federal effort for which one can reasonably anticipate continued Administration support.

On top of this shortfall, the figures are expressed in terms of constant 1976 dollars. Should inflation in the construction sector continue, a near certain proposition, the real needs will be even greater.

Nor should we only be concerned over the total capital costs of the construction grant program. As construction is completed, it is becoming obvious to sponsoring communities that the operating costs of the technologies we are using are very large. On the average, the annual operating cost of a plant is about 10 percent of its total capital cost. Thus a \$10 million plant costs about \$1 million annually to run. When conventional technologies are applied in smaller, rural communities this phenomenon is exacerbated. Frequently, a small town cannot afford the skilled operator needed for the effective and efficient performance of a treatment works. Engineers often do not continue their association with a project for the length of the "shake-down" period—up to one year—after the construction is completed. If communities go broke trying to clean up their water pollution, the political support which this program has enjoyed thus far will be seriously threatened.

In an attempt to cope with the problems of cost and performance, Congress adopted several reforms in the municipal construction grants program. One, which I outlined

earlier, is to require the careful study and consideration of alternative and innovative wastewater treatment technologies before any grant can be made. Projects that produce offsetting revenues, that conserve water, that reduce energy demands, that recycle and reclaim water and nutrients will make a great contribution to reducing the annual costs of these facilities. And especially if water is conserved, the capacity and therefore the capital costs can be contained. Such projects are bound to yield better pollution control, which can be translated into real economic as well as environmental benefits.

To further encourage the adoption of these technologies, the 1977 Clean Water Act provides a bonus Federal share of 10 percent beginning in fiscal year 1979. If an approved alternative or innovative technology is selected, a community can receive 85 percent of the capital costs from the Federal Government. Furthermore, the estimated cost of such a project may exceed the most cost-effective alternative by 15 percent, giving an even greater incentive to overcome the professional bias against new technologies.

To help small communities, the new Clean Water Act makes eligible "individual" treatment technologies which may be located on private property. To see how important this can be, about 25 percent of the U.S. population is still served by septic tanks. Experts tell us that proper design, construction, and maintenance of these septic systems can provide years of trouble-free service and an economical, healthful solution to sewage disposal. Other on-site treatment and disposal systems, as well as non-conventional systems suitable for smaller communities, are also eligible for funding under the 1977 Act, with active involvement by the sponsoring municipality in assuring the proper operation and maintenance of any Federally assisted individual systems.

To ensure that less costly alternatives to conventional treatment technologies are made available in rural communities, the Act requires each "rural" State, one having a rural population of 25 percent or more, to set aside 4 percent of its allotment for use in small towns and villages.

The Clean Water Act of 1977, in addition to reinforcing the basic thrust of the

1972 Amendments, adopted several amendments to the municipal program which give greater resources, policy initiative and flexibility to State and local governments on which EPA increasingly relies to administer this program. For example, States may receive up to 2 percent of their construction grant allotment to manage aspects of the program. Lest there be any doubt, the Declaration of Goals and Policy has been amended to read: "It is the policy of Congress that the States manage the construction grant program under this Act and implement the permit programs under sections 402 and 404 of this Act."

Priority list determinations are to be made solely by the States, unless the projects selected will not result in compliance with the enforceable requirements of the Act. Communities have more options in the design of systems for collecting user charges to pay for operation and maintenance and for recovering the industrial share of capital costs. Small communities can expect some real relief from red tape by combining their applications for step 2 and step 3 grants into one package for projects totaling \$2 million or less (or \$3 million in areas of high costs).

Finally, areawide treatment management planning grants are continued so that any designated agency may receive 100 percent Federal assistance over a two-year period for use in planning the myriad activities which must be coordinated and controlled in order to abate pollution of the waters and prevent further degradation due to growth in economic activity. These section 208 agencies, as they are called, must also deal with the complex problems of non-point sources of pollution, both urban runoff and agricultural erosion. They have sweeping responsibilities, and the Clean Water Act of 1977 adds to them in creating a cost-sharing program to help farmers undertake "best management practices" to control water pollution from pesticide-laden soils.

Apart from the skill and care which Congress applied to the drafting of this new law, and to clarifying our intent and our expectations, in the end the municipal construction grants program will only succeed through the cooperation and consent of those who are most involved in carrying out the law: government officials in the States, municipalities, and the EPA; engineering firms, construction companies and construction workers; planning groups and citizen organizations. The program currently enjoys tremendous political support, in the best sense of the word. To retain this support, the projects which we build must be effective in abating pollution and must be affordable. It is my hope that the Clean Water Act of 1977 contributes to that result. □

The Mounting Sludge Pile

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With 75 percent EPA funding, a Duluth, Minn., project will attempt to produce usable energy from sludge and municipal solid waste. The materials will be burned together in a system that speeds up the combustion of the wet sludge.

Aided by EPA funds, Bangor, Maine, has been composting its sludge for more than two years with a forced air method, a project that has attracted public interest.

More than \$100 million of EPA construction grant funds are being used for pilot projects to evaluate sludge management alternatives.

Eight municipal sludge landfill sites are being studied by EPA to find how far contamination has moved and whether it threatens local groundwater.

Around the country, many potential options for sludge recycling are being explored. One possibility is fixation of sludge by chemicals for safe landfilling and use in highway construction. Another possible system is methane gas recovery from landfills. Reclamation of strip-mined land can involve another use of sludge.

The benefits of such approaches are twofold. The sludge is retrieved as a resource and it is put to beneficial use. With the sludge, nutrients are recycled, materials and energy produced, and damaged land restored.

Sludge illustrates the ecologists' lesson: Everything is connected to everything else. Sludge that is "thrown away" emerges to pollute somewhere else. But sludge that is safely reused protects nature's systems and strengthens the Nation's economy.

With the increasing quantities of wastes, the growing complexity of pollution, and the closing regulatory gap, the sludge riddle may seem impossible. But as American poet James Russell Lowell once wrote, "New occasions teach new ideas." In the effort to resolve the issue of sludge, such ideas are already beginning to emerge. □

(If more information on ocean dumping is needed, EPA recently submitted a report to Congress on the matter. A copy of the report can be obtained by writing Chief, Marine Protection Branch, Division of Oil and Special Materials Control, WH-548, EPA, Washington, D.C. 20460.)

Planning for Clean Water

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mented, "We don't believe government officials, but we do you, because you admit to not having all the answers." We found farmers to be very much concerned about the protection of water resources but even more so about the cost of necessary controls in an increasingly competitive market.

In addition to selling water quality, another of our primary concerns was showing the benefit of undertaking water quality management practices. Toward that end, we have piggy-backed on the previously discussed agricultural institutions. We transferred funds from the 208 continuing planning program to the local soil conservation district and we transferred two staff positions to SCS to concentrate on helping farmers to develop conservation plans.

With our limited resources, we decided to focus on a single watershed located entirely within New Castle County. The largest land holder is Getty Oil, with 3,000 acres in the basin, over half of which Getty leases for farming. Participation of all the landowners in the development of a conservation plan for the entire area has been sought. Proven best management practices from the Indiana Black Creek Demonstration Project will be utilized in the watershed.

We initially suffered a small setback when our monitoring money was cut out of the budget for the project, but some local university graduate students agreed to take on some of that responsibility. Because of the

cutback, and considering the previous research at Black Creek, we decided to allocate the resources toward developing plans for farmers to implement, rather than documenting water quality data in a report.

I'm pleased to say that, at the six month milestone, the program is working. The intensive effort by our 208 engineer and two new SCS staff farmers has resulted in over 60 percent of the watershed plans being completed. Implementation of these plans will begin soon, starting with 8,000 feet of grassed waterways. Even Getty Oil is also now participating in the plan. Incidentally, the communication exchange has been a two way street. Our 208 staff engineer is now fully informed on how to milk 120 cows at one sitting.

Looking at New Castle's success from my new position as Director of EPA's Water Planning Division, I believe the concept used in New Castle County, of having farmers develop their own programs with technical assistance and cost sharing is worthy of further attention. What we all must realize is that voluntary participation by the farmer is one of the keys to successful erosion control. The process may be a long one, involving education, communication, technical assistance, and of course, millions of dollars, but I think it is one that is worth pursuing.

What we are planning for, in a national program, is a continuation of the effort that has already begun on a limited scale. We need to further refine best management practices. We need cost-effective techniques that work toward improving water quality.

We must continue to work with the National Association of Conservation Districts, the Soil Conservation Service and other agricultural agencies. We are currently involved in a joint effort, with NACD, evaluating and monitoring the impact of various practices on water

quality. In over 40 States conservation districts have been involved in 208 planning and implementation, and a sizable number have been designated as the management agency for non-point source water pollution control. These organizations can be our allies in the battle against pollution from sediment erosion.

Congress has authorized a substantial amount of assistance, up to \$600 million through FY 1980, toward the cost of implementing rural best management practices for improved water quality. Known as the Culver Amendment, this section of the Clean Water Act of 1977 authorizes funding for areas, with approved 208 plans, which have sources severely impacting water quality. Funding may also go to soil conservation districts, State soil and water conservation agencies or State water quality agencies to assist in program administration. Funding will go directly to the individual farmer through long term contracts.

I believe that we can drastically reduce the impact of agriculture non-point sources without a national regulatory program. However, to do so will require an exceptional education and communication process.

However, for that small minority of farmers who will not voluntarily comply with the law, a regulatory back up may be necessary to insure that the job gets done in a timely and effective fashion. □

Aquatic Research on the Gulf

Continued from page 15

"Our mission has broadened a great deal since we came into EPA," declares Dr. Thomas W. Duke, Laboratory Director. "We've been looking into organics such as pesticides and PCB's. Then ocean dumping. Then specialized problems of Region 4. We wear as many hats as we can, since there are now many thousands of chemicals on the chemical register that could affect the environment. We've worked also with Region 6 in Dallas on an insecticide case and with Region 3 on Kepone. Now we're involved in in-depth research on modelling to see if our research and predictions on Kepone are valid. That is, what its environmental half-life is, how long it remains in sediments, and what the turn-over time is for shellfish, meaning how long it takes an oyster to expel Kepone."

The growth of the Gulf Breeze laboratory has reflected this changed and enlarged mission in the past eight years. Only about two dozen permanent employees worked there when EPA took over the facility in late 1970. Today about 135 are on its payroll including some contract employees and a contingent of scientists at a field station in Bears Bluff, South Carolina. The laboratory has an annual budget of about \$5 million.

An indication of the enlarged responsibilities of Gulf Breeze was the dedication last October by EPA Deputy Administrator Barbara Blum and U.S. Representative Robert F. L. Sikes of a \$1 million toxicological test facility on Sabine Island. Dr. Stephen Gage, EPA's Assistant Administrator for Research and Development, also spoke at the ceremony.

The new building is a 7,500-square-foot "wet lab" equipped with a flowing fresh seawater system able to deliver 450 gallons of water a minute. The raw seawater is pumped directly into the lab from Santa Rosa Sound. Because it can duplicate the natural conditions

in which marine organisms live, the aquatic laboratory can test subtle, long-lasting effects of pollutants on marine life. Dr. Duke estimates that the facility will enhance threefold the laboratory's ability to evaluate the environmental effects of toxic substances in estuaries.

The Gulf Breeze laboratory in the past has played a prominent role in EPA pesticide registration, and information derived from its tests often appear on the caution label of commercial pesticides.

"Because of public concern that estuaries and marine waters receive undue amounts of pesticides and other organics," Dr. Duke explains, "we are now being asked for more critical evaluations of pesticide formulations, especially those used near aquatic ecosystems. Our new test facility will aid researchers in our continuing short and long-term assessments of chemical contaminants and their marine environmental pathways."

Gulf Breeze now not only performs research for EPA but also participates with other Federal agencies in projects of mutual interest. The National Oceanic and Atmospheric Administration, for example, is helping to fund studies of the environmental impact on marine organisms of offshore drilling. With spiraling energy needs, drilling at sea off the coast of Texas and Louisiana and oil spills from offshore deep-water ports are both expected to increase. Unfortunately, the major oil producing areas also are the most productive shrimping grounds in the Gulf of Mexico. Shrimp and fish are attracted to the rig structures and scientists are studying the effects of their exposure to petroleum hydrocarbons. Researchers from Gulf Breeze are now looking into the problem at a Navy platform 12 miles off the coast of Panama City, Fla.

The laboratory also is about to embark on a broad study of carcinogens in the marine environment along the Gulf coast, funded by the National Cancer Institute. Dr. John Couch, coordinator of the project, says the environmental pathology team will examine aquatic



Dr. Thomas Duke is the director of the EPA Environmental Research Laboratory at Gulf Breeze, Fla. The main laboratory building is seen in the background.

species along the coasts of Florida, Alabama, and Mississippi to see how carcinogens are affecting them and also whether there is a link through the food chain with the incidence of human cancer in the region.

In 1976 Congress directed EPA to conduct an in-depth study of the Chesapeake Bay, and the Gulf Breeze laboratory has assumed an important role in that program. Dr. Tudor T. Davies, deputy director of the laboratory, is chairman of the technical advisory committee for the Chesapeake study and also administers research grants for the program. Although original plans outlined about ten problem areas associated with the Chesapeake, the study group is focusing on three major ones: toxic substances, eutrophication, and the disappearance of submerged aquatic vegetation from the Bay.

Thus far Congress has provided about \$10.5 million for the study. Jack J. Schramm, Region 3 Administrator, is national program director. A number of other EPA facilities also are making their resources available including the Athens, Ga., laboratory; the Annapolis Field Office of Region 3; the Las Vegas Environmental Monitoring and Support Laboratory; the Corvallis Environmental Research Laboratory; and the Environmental Photographic Interpretation Complex in Warrenton, Va.

Dr. Davies coordinated earlier work on the environmental effects of Kepone, and follow-up studies of its effects on oyster tissue and chromosomes

now are being pursued in a separate project with the National Oceanic and Atmospheric Administration at the National Marine Fisheries Service laboratory in Oxford, Md.

One of the living organisms cultured at the Gulf Breeze lab is the southern mangrove tree.

"Mangroves grow in intertidal waters on the Atlantic and Gulf coasts of southern States," explains Dr. Gerald Walsh, a research ecologist. "They're used to produce lumber, telephone poles, charcoal, and tannin, and they also grow in important spawning grounds for fish and shrimp.

"We've found they're resistant to a number of substances like heavy metals, insecticides, and herbicides. But unfortunately they transport toxics from the soil to their leaves, and when the leaves fall into the water, they're ingested by shrimp and other aquatic animals. So we have been growing mangrove seedlings in the laboratory to study this whole problem more thoroughly," he says.

Gulf Breeze has been able to add a dimension to its field work by means of a mobile laboratory, which along with two others also is used by Region 4's Surveillance and Analysis Division (EPA Journal, November 1977). The Department of Commerce's Bureau of Economic Analysis has forecast very heavy increases in production over the next few decades in industries such as paper, textiles, and chemicals, and Dr. Walsh points out that it will be necessary to regulate their effluent and test it to see if it meets standards. The importance of a mobile lab is that the vehicle can test such discharges right at the site where they pour into receiving waters.

In addition to its contracts with other Federal agencies, Gulf Breeze has a grant with the University of West Florida to monitor Santa Rosa Sound right on the laboratory's northern doorstep. The two-year agreement begun last November will make use of 30 sampling stations to measure salinity, pollution, and algae and bacteria counts.

Specialized research at the Bears Bluff, S.C. field station, under direction of Dr. William P. Davis, is assessing the impact of chlorination of marine waters on marine organisms. Electric power generation stations located in coastal areas use chlorination to cut down fouling of their cooling systems, and wastewater treatment plants also add chlorine in the final stage before discharge. Since this chemical plays a role in fish kills, the field station, located about 25 miles south of Charleston on a tidal estuary, is studying the environmental impact of chlorination on various crustacea, oysters, fish and communities of marine organisms.

A master plan for the Gulf Breeze facility calls for additions in several areas in the future. These include a storage building for hazardous substances, a laboratory for testing the effects on animals of suspected carcinogens, a separate facility for chemical analysis of carcinogens, and—not least important because of the Gulf's occasional hurricanes—a sea wall around part of Sabine Island.

Despite the storms, one of the bonuses for the men and women working at the Gulf Breeze laboratory is its almost idyllic surroundings. The climate is semi-tropical, and palm trees and shimmering white sands are part of the local ambience. As a result there have been far more applicants than job vacancies in recent years. □

Region 7 Report

By Dr. Kathleen Q. Camin, Regional Administrator

As American citizens look at their environment now, they are dazzled by the growing complexity of it. Big problems have mushroomed out of a world of big business, big government, and big institutions. These problems have been made even larger by specialized scientific technical language.

At the same time, the men and women of EPA have been increasingly cut off from the citizens they serve by the magnitude of the task of cleaning up the environment. The effort of bringing the two together has been called public participation but in simpler times it would have been called "communication."

All are aware of the problem. People who work at protecting the environment worry about disappearing into a fog of MOL's, I/I's, AZMA's, red tape, and FTS numbers. Citizens worry that the quality of their air, water, and land will deteriorate before they find out whom to talk to about it. To bring Government and citizens together to exchange knowledge is the problem. As I have met with citizens all across the Region, I found even the most experienced environmental groups have trouble getting help in the EPA and understanding the help when it is given. If the Sierra Club was baffled, what of the citizen calling the government for the first time because of a chemical spill?

To overcome the jargon and contact barrier separating the Region 7 staff from those needing their help, a new communication channel was established — a toll-free Environmental Action Line. With very little promotion, calls began to flow in. Because the action line filled

a need, calls soon reached ten a day. As the Regional Action Line Consultants know that the buck stops with them, they are able to handle 75 percent of the calls on the spot. The rest are referred to the appropriate personnel or an outside agency. The action line handles calls about subjects ranging from airplane noise to sewer odors.

A good example is the call from Nancy McConnell. Nancy was upset, worried and bewildered by the situation at her parent's farm. Her parents had been forced to move, cattle had died, a great deal of money had been lost and her mother was suffering from possible lead poisoning. The family felt that oil and gas runoff from a nearby truck stop was causing the problem. But how to get action?

Nancy heard about the Environmental Action Line and decided to give it a try. When the phone call was received at the Regional Office, it was immediately referred to the Region 7 Emergency Response section, which began work. The State Department of Environmental Quality and local officials were alerted. Two members of the EPA Region 7 staff went to solve the problem. They found that the creek was contaminated

with oil from the truck stop parking lot. The oil had accumulated over the winter. When the snow melted, it washed the oil from the parking lot into a ditch. The ditch carried the oil to a creek which flowed across the McConnell's property.

Action to clean the creek up began immediately. The result was a successful removal of the oil.

Not all the results have been this successful, but many of the problems can be solved in short order and all are followed up. EPA is able to give service to many citizens this way, but an unexpected benefit has been citizens coming forward to help protect the environment by reporting violations such as fuel contamination and tampering with automobile pollution control devices. The fact that the Environmental Action Line has become a source of two-way communication promises to extend the Region's ability to improve the environment.

In areas where specific groups will have an interest in technical subjects, Region 7 is trying other new approaches. A group of interested and knowledgeable farmers is lending its knowledge of agriculture and farm situations and has joined with EPA personnel to form a working group. This exchange helps the Region to work for realistic regulations in rural areas.

When EPA was forced to assume primacy for water supply in the State of Missouri, city officials had a difficult time with new forms and some of the new regulations. Eight workshops were set up across the State and all water suppliers were invited.



Dr. Kathleen Q. Camin



Regional water supply personnel discussed the new situation in depth. Representative operators appeared on the program and asked all the questions that were on their minds. As a result, the operators understood the law better and the quality of their reporting improved. The Regional personnel came away with a good understanding of the operators' problems.

Because of the deep interest of city councils, civic clubs, and environmental groups in how air quality regulations affect their community's future, Region 7 has established a pool

of speakers on the Clean Air Act. This group is drawn from all fields but is specially trained by the air pollution staff. These speakers will talk to all interested groups on the vital need for clean air and what will be needed to clean it up.

The communication problem is still ahead of us. The toxic effect of minute quantities of pollutants over a long period of time must still be explained. Complex water pollution trade-offs must be made understandable. EPA still is heavily working in many very narrowly specialized technical fields which almost defy communication. However, Region 7 strongly

feels that the Environmental Action Line and other public participation efforts are a good start. While serving the people of the Region, we are also able to see better their first hand reaction to environmental issues. This clarifies our thinking on priorities and methods. Quite often too, we find that people want to help clean up the environment themselves if given the opportunity. □

Flocks of blue geese and snow geese at the Squaw Creek National Wildlife Refuge near Mound City, Mo.

Back Cover: Children romp in the surf at Henlopen Point, Del., beach.



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